

PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

United States Patent and Trademark
Office
(Box PCT)
Washington D.C. 20231
United States of America

in its capacity as elected Office

Date of mailing (day/month/year) 15 May 1996 (15.05.96)	
International application No. PCT/JP95/01983	Applicant's or agent's file reference PWO-14170
International filing date (day/month/year) 29 September 1995 (29.09.95)	Priority date (day/month/year) 07 October 1994 (07.10.94)
Applicant OHKI, Hidenori et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

17 April 1996 (17.04.96)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

<p>The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No.: (41-22) 740.14.35</p>	<p>Authorized officer N. Kijima</p> <p>Telephone No.: (41-22) 730.91.11</p>
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PATENT COOPERATION TREATY

PCT

REC'D 26 FEB 1997

WIPO

PCT


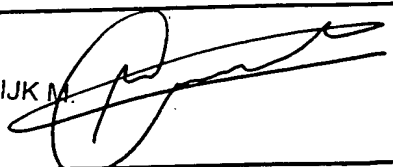
INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PWO-14170	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/JP 95/ 01983	International filing date (day/month/year) 29/09/1995	Priority date (day/month/year) 07/10/1994
International Patent Classification (IPC) or national classification and IPC C07K7/56		
Applicant FUJISAWA PHARMACEUTICAL CO., LTD. et al.		

- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This **REPORT** consists of a total of 6 sheets, including this cover sheet.
☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
These annexes consists of a total of _____ sheets.

- This report contains indications and corresponding pages relating to the following items:
 - I ☒ Basis of the report
 - II ☐ Priority
 - III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☒ Certain observations on the international application

Date of submission of the demand 17/04/1996	Date of completion of this report 24.02.97
Name and mailing address of the IPEA  European Patent Office, P.B. 5818 Patentaan 2 NL-2280 HV Rijswijk - Netherlands Tel. (+31-70) 340-2040, Tx. 31 651 epo nl. Fax: (+31-70) 340-3018	Authorized officer GROENENDIJK M.  Telephone No.

I. Basis of the report

1. This report has been drawn up on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*

☒ the international application as originally filed

☐ the description, pages , as originally filed
pages , filed with the demand
pages , filed with the letter of

☐ the claims, Nos. , as originally filed
Nos. , as amended under Article 19
Nos. , filed with the demand
Nos. , filed with the letter of

☐ the drawings, sheets / fig. , as originally filed
sheets / fig. , filed with the demand
sheets / fig. , filed with the letter of

2. The amendments have resulted in the cancellation of:

☐ the description, pages:
☐ the claims, Nos.
☐ the drawings, sheets / fig.

3. ☐ This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2 (c)).

4. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application,
☒ claims Nos. 17,19

because:

- ☒ the said international application, or the said claims relate to the following Nos. 17,19
subject matter which does not require an international preliminary examination
(specify):

Method of treatment of the human/animal body (Art.34(4)(a)(i) and Rule 67.1(iv) PCT)

- ☐ the description, claims or drawings (*indicate particular elements below*) or
said claims are so unclear that no meaningful opinion could be formed
(specify): Nos.
- ☐ the claims, or said claims are so inadequately supported by the description
no meaningful opinion could be formed. Nos.
- ☐ no international search report has been established for said claims Nos.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Claims		YES
	Claims	1-16,18	NO
Inventive Step	Claims		YES
	Claims	1-16,18	NO
Industrial Applicability	Claims	1-16,18	YES
	Claims		NO

2. Citations and Explanations

The following documents have been considered for the purposes of this report:

D1:EP-A-0462531(FUJISAWA PHARMACEUTICAL CO)

D2:EP-A-0561639(ELI LILLY AND COMPANY)

I. NOVELTY

Document D1 discloses cyclic hexapeptides exhibiting an antifungal activity having a ring structure that is identical to the structure of the present application. Moreover the respective definitions of the R1 side chain in D1 and the present application overlap (almost) completely (see D1, page 8, line 44 to page 10, line 57: page 11, fig. 1h, examples 1-55). Even some compounds in both applications are identical (e.g. D1, example 51 and example 123 of the present application).

The Examiner is guided by the principle according to which the disclosure in a prior document likely to affect the novelty of a claim is not necessarily limited to the specific working examples, but also comprises any reproducible technical teaching described in the document. In order to acknowledge novelty to the not specifically disclosed overlapping subject-matter it is considered to be necessary that said subject-matter is based on a new technical teaching. In the present application this teaching could be the provision of compounds exhibiting a surprising and advantageous effect. However the experimental data relate to only one compound (see page 43) which exhibits an activity similar to the prior art compounds.

Therefore it is at present not apparent whether the subject-matter of the overlapping area relates to a new technical teaching (based on a new "technical element") with respect to the prior art and therefore novelty cannot be recognised for said overlapping area. Consequently the claims 1-14 and the related claims 15,16 and 18 are considered to lack novelty under

Art.33(2) PCT.

II. INVENTIVE STEP

- 1) The closest prior art is considered to be document D1 disclosing a cyclic hexapeptide exhibiting an antifungal activity having a ring structure that is identical to the structure of the present application.
- 2) The novel compounds of the present application differ only in the structure of the side chain R1. They appear to exhibit also an antifungal activity of the same type and order of magnitude as the prior art compounds.
- 3) The problem to be solved may therefore be considered to be the provision of alternative compounds having an antifungal activity.
- 4) However the structures of the side chain R1 in the present novel compounds are very similar to those defined in D1.
- 5) Moreover document D2 discloses cyclic hexapeptides of the same type as the present ones, which prior art compounds also contain side chains that are identical or very similar to the side chains of the present compounds.
- 6) In the absence of any indication of the presence of an unexpected effect, the examiner is therefore of the opinion that the side chains used in the compounds of the application are merely selections out of several possibilities which the skilled person would come to, in accordance with circumstances, without the exercise of inventive skill in order to solve the problem posed.
- 7) Consequently the novel compounds of the application are considered to lack an inventive step and therefore the claims 1-14 and the related claims 15, 16 and 18 in a form to overcome the novelty objections are not considered to fulfil the requirements of Art.33(3) PCT.

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The claims 1-6 and 15 contain expressions like "aryl" and "heterocyclyl" which are, even in the description, ill-defined and therefore render the scope of said claims unclear under Art.6 PCT.

INTERNATIONAL COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

CONFIRMATION OF FAX

To:

SEKI, Hideo
Fujisawa Pharmaceutical Co., Ltd.
Osaka Factory
1-6, Kashima 2-chome, Yodogawa-ku
Osaka-shi
Osaka 532
JAPON

NOTIFICATION OF TRANSMITTAL OF INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing
(day/month/year)

24.02.97

Applicant's or agent's file reference

PWO-14170

IMPORTANT NOTIFICATION

International application No.

PCT/JP 95/01983

International filing date (day/month/year)

29/09/1995

Priority date (day/month/year)

07/10/1994

Applicant

FUJISAWA PHARMACEUTICAL CO., LTD. et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices)(Article 39(1))(see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA

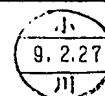


European Patent Office, P.B. 5818 Patentaan 2
NL-2280 HV Rijswijk - Netherlands
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

G. M. Kruidenberg

Telephone No.



PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PWO-14170	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/JP 95/ 01983	International filing date (day/month/year) 29/09/1995	Priority date (day/month/year) 07/10/1994
International Patent Classification (IPC) or national classification and IPC C07K7/56		
Applicant FUJISAWA PHARMACEUTICAL CO., LTD. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


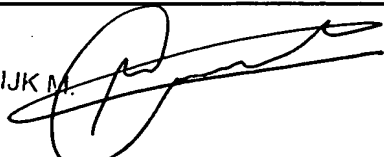
2. This **REPORT** consists of a total of 6 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consists of a total of _____ sheets.

3. This report contains indications and corresponding pages relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
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Date of submission of the demand 17/04/1996	Date of completion of this report 24.02.97
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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/JP95/01983

I. Basis of the report

1. This report has been drawn up on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*

☒ the international application as originally filed

☐ the description, pages

, as originally filed

pages

, filed with the demand

pages

, filed with the letter of

☐ the claims, Nos.

, as originally filed

Nos.

, as amended under Article 19

Nos.

, filed with the demand

Nos.

, filed with the letter of

☐ the drawings, sheets / fig.

, as originally filed

sheets / fig.

, filed with the demand

sheets / fig.

, filed with the letter of

2. The amendments have resulted in the cancellation of:

☐ the description, pages:

☐ the claims, Nos.

☐ the drawings, sheets / fig.

3. ☐ This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2 (c)).

4. Additional observations, if necessary:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/JP95/01983

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 17,19

because:

☒ the said international application, or the said claims relate to the following Nos. 17,19
subject matter which does not require an international preliminary examination
(specify):

Method of treatment of the human/animal body (Art.34(4)(a)(i) and Rule 67.1(iv) PCT)

☐ the description, claims or drawings (*indicate particular elements below*) or
said claims are so unclear that no meaningful opinion could be formed
(specify): Nos.

☐ the claims, or said claims are so inadequately supported by the description
no meaningful opinion could be formed. Nos.

☐ no international search report has been established for said claims Nos.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Claims		YES
	Claims	1-16,18	NO
Inventive Step	Claims		YES
	Claims	1-16,18	NO
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- 3) The problem to be solved may therefore be considered to be the provision of alternative compounds having an antifungal activity.
- 4) However the structures of the side chain R1 in the present novel compounds are very similar to those defined in D1.
- 5) Moreover document D2 discloses cyclic hexapeptides of the same type as the present ones, which prior art compounds also contain side chains that are identical or very similar to the side chains of the present compounds.
- 6) In the absence of any indication of the presence of an unexpected effect, the examiner is therefore of the opinion that the side chains used in the compounds of the application are merely selections out of several possibilities which the skilled person would come to, in accordance with circumstances, without the exercise of inventive skill in order to solve the problem posed.
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The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The claims 1-6 and 15 contain expressions like "aryl" and "heterocyclyl" which are, even in the description, ill-defined and therefore render the scope of said claims unclear under Art.6 PCT.

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference PWO-14170	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/JP 95/01983	International filing date (day/month/year) 29/09/95	(Earliest) Priority Date (day/month/year) 07/10/94
Applicant FUJISAWA PHARMACEUTICAL CO., LTD. et al.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☒ Certain claims were found unsearchable (see Box I).

2. ☐ Unity of invention is lacking (see Box II).

3. ☐ The international application contains disclosure of a nucleotide and/or amino acid sequence listing and the international search was carried out on the basis of the sequence listing

☐ filed with the international application.

☐ furnished by the applicant separately from the international application,

☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.

☐ Transcribed by this Authority

4. With regard to the title, ☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

Cyclic hexapeptides having antibiotic activity

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is:

Figure No. _____ ☐ as suggested by the applicant.

☐ None of the figures.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

INTERNATIONAL SEARCH REPORT

national application No.

PCT/JP 95/01983

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 17, 19
because they relate to subject matter not required to be searched by this Authority, namely:
Remark: Although claims 17 and 19 are directed to a method of treatment of the human/animal body the search has been carried out and based on the alleged effects of the compound/composition.

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No.

JP 95/01983

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 C07K7/56 A61K38/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C07K A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X, Y	EP, A, 0 462 531 (FUJISAWA PHARMACEUTICAL CO) 27 December 1991 see the whole document ---	1-19
Y	EP, A, 0 561 639 (LILLY CO ELI) 22 September 1993 see the whole document -----	1-19

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- * & * document member of the same patent family

Date of the actual completion of the international search

8 December 1995

Date of mailing of the international search report

11. 01. 96

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+ 31-70) 340-3016

Authorized officer

Groenendijk, M

INTERNATIONAL SEARCH REPORT

on patent family members

International Application No

JP 95/01983

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0462531	27-12-91	AU-B- 651347	21-07-94
		AU-B- 7843591	16-01-92
		CN-A- 1059729	25-03-92
		JP-A- 4352799	07-12-92
		OA-A- 9369	15-09-92
		US-A- 5376634	27-12-94
		EP-A- 0486011	20-05-92
EP-A-0561639	22-09-93	JP-A- 5000966	08-01-93
		AU-B- 3534193	23-09-93
		CZ-A- 9300416	13-07-94
		JP-A- 6056892	01-03-94

PARENT COOPERATION TREATY

PCT

NOTIFICATION CONCERNING
SUBMISSION OF PRIORITY DOCUMENTS

(PCT Administrative Instructions, Section 411)

From the INTERNATIONAL BUREAU

To:

SEKI, Hideo
Fujisawa Pharmaceutical Co., Ltd.
Osaka Factory
1-6, Kashima 2-chome
Yodogawa-ku, Osaka-shi
Osaka 532
JAPON

Date of mailing (day/month/year) 08 November 1995 (08.11.95)		IMPORTANT NOTIFICATION	
Applicant's or agent's file reference PWO-14170			
International application No. PCT/JP95/01983	International filing date (day/month/year) 29 September 1995 (29.09.95)	Priority date (day/month/year) 07 October 1994 (07.10.94)	
Applicant FUJISAWA PHARMACEUTICAL CO., LTD. et al			

The applicant is hereby notified of the date of receipt by the International Bureau of the priority document(s) relating to the following application(s):

<u>Priority application No.:</u>	<u>Priority date:</u>	<u>Priority country:</u>	<u>Date of receipt of priority document:</u>
9420425.2	07 Oct 1994 (07.10.94)	GB	06 Nov 1995 (06.11.95)
9508745.8	28 Apr 1995 (28.04.95)	GB	06 Nov 1995 (06.11.95)

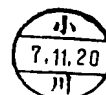
The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

N. Kijima

Telephone No.: (41-22) 730.91.11



INTERNATIONAL COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:

SEKI, Hideo
Fujisawa Pharmaceutical Co., Ltd.
Osaka Factory
1-6, Kashima 2-chome
Yodogawa-ku, Osaka-shi
Osaka 532
JAPON

Date of mailing (day/month/year)

18 April 1996 (18.04.96)

Applicant's or agent's file reference

PWO-14170

IMPORTANT NOTICE

International application No.

PCT/JP95/01983

International filing date

29 September 1995 (29.09.95)

Priority date

07 October 1994 (07.10.94)

Applicant

FUJISAWA PHARMACEUTICAL CO., LTD. et al

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:

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2. In accordance with Rule 47.1(c), third sentence, each designated Office will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Offices.

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on

18 April 1996 (18.04.96) under No. WO 96/11210

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

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If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

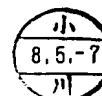
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Continuation of Form PCT/IB/308

**NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF
THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES**

Date of mailing (day/month/year) 18 April 1996 (18.04.96)	IMPORTANT NOTICE
Applicant's or agent's file reference PWO-14170	International application No. PCT/JP95/01983
<p>The designated Office(s) of:</p> <p>HU,MX,OA</p> <p>has (have) waived the requirement for such a communication, but nevertheless a copy of the international application need not be furnished by the applicant to the Office(s) concerned.</p>	



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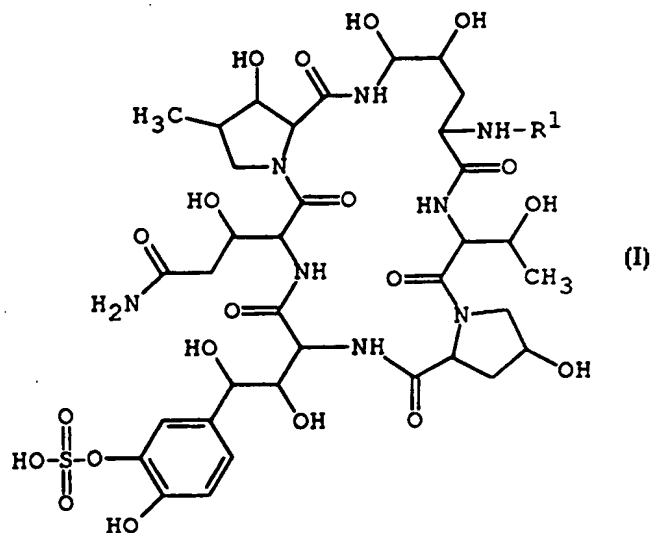
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(54) Title: CYCLIC HEXAPEPTIDES HAVING ANTIBIOTIC ACTIVITY

(57) Abstract

This invention relates to new polypeptide compounds represented by formula (I), wherein R^1 is as defined in the description and pharmaceutically acceptable salt thereof which have antimicrobial activities (especially, antifungal activities), inhibitory activity on β -1,3-glucan synthase, to process for preparation thereof, to a pharmaceutical composition comprising the same, and to a method for the prophylactic and/or therapeutic treatment of infectious diseases including *Pneumocystis carinii* infection (e.g. *Pneumocystis carinii* pneumonia) in a human being or an animal.



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DESCRIPTION

Cyclic hexapeptides having antibiotic activity

5 TECHNICAL FIELD

The present invention relates to new polypeptide compound and a pharmaceutically acceptable salt thereof which are useful as a medicament.

10 BACKGROUND ART

In U.S. Pat. No. 5,376,634, there are disclosed the polypeptide compound and a pharmaceutically acceptable salt thereof, which have antimicrobial activities (especially antifungal activity).

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DISCLOSURE OF INVENTION

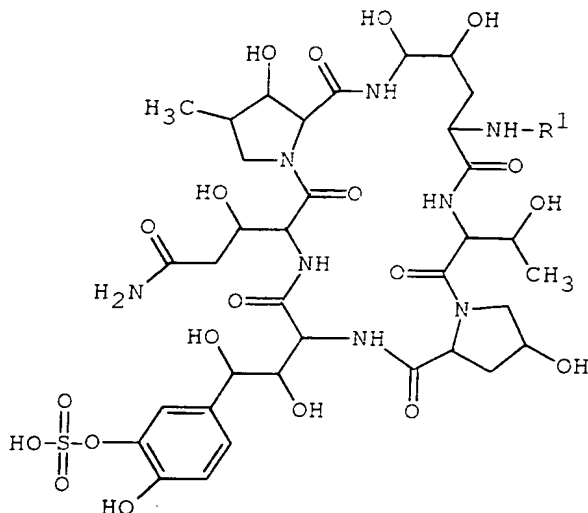
The present invention relates to new polypeptide compound and a pharmaceutically acceptable salt thereof.

More particularly, it relates to new polypeptide
20 compound and a pharmaceutically acceptable salt thereof, which have antimicrobial activities [especially, antifungal activities, in which the fungi may include Aspergillus, Cryptococcus, Candida, Mucor, Actinomyces, Histoplasma, Dermatophyte, Malassezia, Fusarium and the like.], inhibitory activity on β -1,3-glucan synthase, and further which are expected to be useful for the prophylactic and/or therapeutic treatment of Pneumocystis carinii infection (e.g. Pneumocystis carinii pneumonia) in
25 a human being or an animal, to a process for preparation thereof, to a pharmaceutical composition comprising the same, and to a method for the prophylactic and/or
30 therapeutic treatment of infectious diseases including Pneumocystis carinii infection (e.g. Pneumocystis carinii pneumonia) in a human being or an animal.

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The object polypeptide compound used in the present invention are new and can be represented by the following general formula [I] :



wherein R¹ is lower alkanoyl substituted with unsaturated 6-membered heteromonocyclic group containing at least one nitrogen atom which may have one or more suitable substituent(s);

lower alkanoyl substituted with 1,2,3,4-tetrahydroisoquinoline which may have one or more suitable substituent(s);

lower alkanoyl substituted with unsaturated condensed heterocyclic group containing at least one oxygen atom which may have one or more suitable substituent(s);

lower alkanoyl substituted with unsaturated condensed heterocyclic group containing 1 to 3 sulfur atom(s) which may have one or more suitable substituent(s);

lower alkanoyl substituted with

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unsaturated condensed heterocyclic group
containing 2 or more nitrogen atom(s) which
may have one or more suitable
substituent(s);

5 lower alkanoyl substituted with saturated
3 to 8 membered heteromonocyclic group
containing at least one nitrogen atom which
may have one or more suitable
substituent(s);

10 ar(lower)alkenoyl substituted with aryl
which may have one or more suitable
substituent(s);

naphthyl(lower)alkenoyl which may have one
or more higher alkoxy;

15 lower alkynoyl which may have one or more
suitable substituent(s);

(C₂-C₆)alkanoyl substituted with naphthyl
having higher alkoxy;

20 ar(C₂-C₆)alkanoyl substituted with aryl
having one or more suitable substituent(s),
in which ar(C₂-C₆)alkanoyl may have one or
more suitable substituent(s);

25 aroyl substituted with heterocyclic group
which may have one or more suitable
substituent(s), in which aroyl may have one
or more suitable substituent(s);

30 aroyl substituted with aryl having
heterocyclic(higher)alkoxy, in which
heterocyclic group may have one or more
suitable substituent(s);

aroyl substituted with aryl having lower
alkoxy(higher)alkoxy;

aroyl substituted with aryl having lower
alkenyl(lower)alkoxy;

35 aroyl substituted with 2 lower alkoxy;

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aroyl substituted with aryl having lower alkyl;

aroyl substituted with aryl having higher alkyl;

5 aryloxy(lower)alkanoyl which may have one or more suitable substituent(s);

ar(lower)alkoxy(lower)alkanoyl which may have one or more suitable substituent(s);

10 arylamino(lower)alkanoyl which may have one or more suitable substituent(s);

lower alkanoyl substituted with pyrazolyl which has lower alkyl and aryl having higher alkoxy;

15 lower alkoxy(higher)alkanoyl, in which higher alkanoyl may have one or more suitable substituent(s);

20 aroyl substituted with aryl having heterocyclicoxy, in which heterocyclicoxy may have one or more suitable substituent(s);

aroyl substituted with cyclo(lower)alkyl having lower alkyl;

indolylcarbonyl having higher alkyl;

naphthoyl having lower alkyl;

25 naphthoyl having higher alkyl;

naphthoyl having lower alkoxy(higher)alkoxy;

aroyl substituted with aryl having lower alkoxy(lower)alkoxy(higher)alkoxy;

30 aroyl substituted with aryl having lower alkoxy(lower)alkoxy;

aroyl substituted with aryl which has aryl having lower alkoxy;

35 aroyl substituted with aryl which has aryl having lower alkoxy(lower)alkoxy;

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aroyl substituted with aryl having
heterocyclicoxy(higher)alkoxy;

aroyl substituted with aryl having
aryloxy(lower)alkoxy;

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aroyl substituted with aryl having
heterocycliccarbonyl(higher)alkoxy;

lower alkanoyl substituted with oxazolyl
which has aryl having higher alkoxy;

10

lower alkanoyl substituted with furyl
which has aryl substituted with aryl having
lower alkoxy;

lower alkanoyl substituted with triazolyl
which has oxo and aryl having higher alkyl;
higher alkanoyl having hydroxy;

15

higher alkanoyl having ar(lower)alkyl and
hydroxy;

3-methyl-tridecenoyl; or

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(C₂-C₆)alkanoyl substituted with aryl
having higher alkoxy, in which (C₂-
C₆)alkanoyl may have amino or protected
amino.

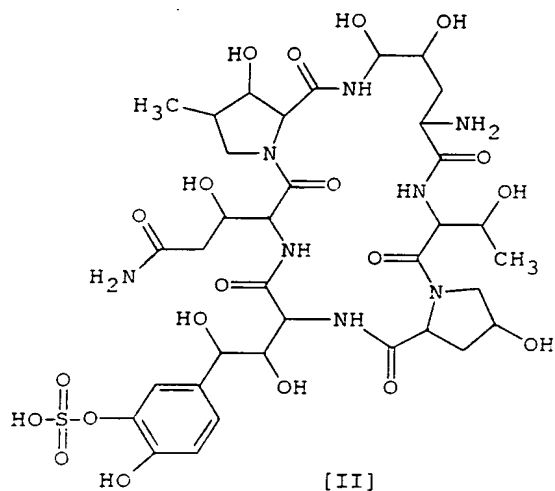
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The new polypeptide compound [I] and a
pharmaceutically acceptable salt thereof can be prepared
by the process as illustrated in the following reaction
scheme or can be prepared by elimination reaction of amino
protective group in R¹.

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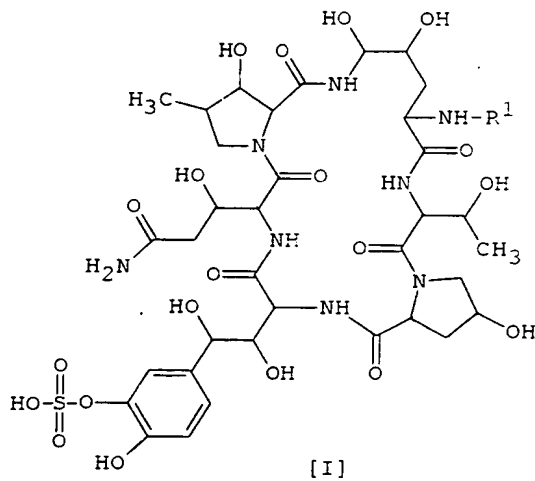
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Process 1

or its reactive derivative
at the amino group
or a salt thereof

R^1-OH [III]

or its reactive derivative
at the carboxy group
or a salt thereof



or a salt thereof

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wherein R¹ is as defined above.

Suitable pharmaceutically acceptable salts of the object polypeptide compound [I] are conventional non-toxic salts and may include a salt with a base or an acid addition salt such as a salt with an inorganic base, for example, an alkali metal salt (e.g., sodium salt, potassium salt, etc.), an alkaline earth metal salt (e.g., calcium salt, magnesium salt, etc.), an ammonium salt; a salt with an organic base, for example, an organic amine salt (e.g., triethylamine salt, pyridine salt, picoline salt, ethanolamine salt, triethanolamine salt, dicyclohexylamine salt, N,N'-dibenzylethylenediamine salt, etc.); an inorganic acid addition salt (e.g., hydrochloride, hydrobromide, sulfate, phosphate, etc.); an organic carboxylic sulfonic acid addition salt (e.g., formate, acetate, trifluoroacetate, maleate, tartrate, fumarate, methanesulfonate, benzenesulfonate, toluenesulfonate, etc.); a salt with a basic or acidic amino acid (e.g., arginine, aspartic acid, glutamic acid, etc.).

In the above and subsequent descriptions of the present specification, suitable examples and illustration of the various definitions which the present invention intends to include within the scope thereof are explained in detail as follows.

The term "lower" is used to intend a group having 1 to 6 carbon atom(s), unless otherwise provided.

The term "higher" is used to intend a group having 7 to 20 carbon atoms, unless otherwise provided.

Suitable example of "one or more" may be the number of 1 to 6, in which the preferred one may be the number of 1 to 3.

Suitable example of "lower alkanoyl" may include

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straight or branched one such as formyl, acetyl, 2-methylacetyl, 2,2-dimethylacetyl, propionyl, butyryl, isobutyryl, pentanoyl, 2,2-dimethylpropionyl, hexanoyl, and the like.

5 Suitable example of "suitable substituent(s)" in the groups such as "lower alkanoyl substituted with unsaturated 6-membered heteromonocyclic group containing at least one nitrogen atom which may have one or more
10 suitable substituent(s)", "lower alkanoyl substituted with 1,2,3,4-tetrahydroisoquinoline which may have one or more suitable substituent(s)", etc. may include lower alkoxy as mentioned below, higher alkoxy as mentioned below, lower alkyl as mentioned below, higher alkyl as mentioned below, higher alkoxy(lower)alkyl, lower alkoxycarbonyl, oxo, aryl
15 which may have one or more lower alkoxy, aryl which may have one or more higher alkoxy, aryl which may have one or more lower alkyl, aryl which may have one or more higher alkyl, aryl substituted with aryl which may have one or more lower alkoxy, aryl substituted with aryl which may
20 have one or more higher alkoxy, aryl substituted with aryl which may have one or more lower alkyl, aryl substituted with aryl which may have one or more higher alkyl, aroyl which may have one or more lower alkoxy, aroyl which may have one or more higher alkoxy, aroyl which may have one
25 or more lower alkyl, aroyl which may have one or more higher alkyl, heterocyclic group which may have one or more lower alkoxy, heterocyclic group which may have one or more higher alkoxy, aryl having heterocyclic(higher)alkoxy, heterocyclic group which may
30 have aryl having higher alkoxy, heterocyclic group which may have aryl having lower alkoxy(higher)alkoxy, heterocyclic group which may have aryl having lower alkoxy, lower alkoxy(lower)alkyl, halo(lower)alkoxy, lower alkenyloxy, halo(higher)alkoxy, lower
35 alkoxy(higher)alkoxy, aryl which may have one or more

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lower alkoxy(lower)alkoxy, heterocyclic group, aryl which may have one or more lower alkoxy(higher)alkoxy, aryl which may have one or more higher alkenyloxy, cyclo(lower)alkyl which may have aryl, aryl substituted with heterocyclic group which may have lower alkyl and oxo, cyclo(lower)alkyl which may have one or more lower alkyl, aryl which may have cyclo(lower)alkyl, aryl which may have heterocyclic group, and the like.

Suitable example of "lower alkoxy" may include straight or branched one such as methoxy, ethoxy, propoxy, isopropoxy, butoxy, isobutoxy, tert-butoxy, pentyloxy, tert-pentyloxy, neo-pentyloxy, hexyloxy, isohexyloxy and the like,

in which the preferred one may be methoxy, ethoxy, propoxy, butoxy, pentyloxy, hexyloxy and isohexyloxy.

Suitable example of "higher alkoxy" may include straight or branched one such as heptyloxy, octyloxy, 3,5-dimethyloctyloxy, 3,7-dimethyloctyloxy, nonyloxy, decyloxy, undecyloxy, dodecyloxy, tridecyloxy, tetradecyloxy, hexadecyloxy, heptadecyloxy, octadecyloxy, nonadecyloxy, icosyloxy, and the like,

in which the preferred one may be (C₇-C₁₄)alkoxy, and the more preferred one may be heptyloxy and octyloxy.

Suitable example of "lower alkyl" may include straight or branched one having 1 to 6 carbon atom(s), such as methyl, ethyl, propyl, isopropyl, butyl, isobutyl, sec-butyl, tert-butyl, pentyl, tert-pentyl, neo-pentyl, hexyl, isohexyl and the like,

in which the preferred one may be methyl, pentyl, hexyl and isohexyl.

Suitable example of "higher alkyl" may include straight or branched one having 7 to 20 carbon atoms, such as heptyl, octyl, 3,5-dimethyloctyl, 3,7-dimethyloctyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, pentadecyl, hexadecyl, heptadecyl, octadecyl, nonadecyl,

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icosyl, and the like,

in which the preferred one may be (C₇-C₁₄)alkyl, and the more preferred one may be heptyl, octyl, nonyl and decyl.

Suitable example of "aryl" and "ar" moiety may
5 include phenyl which may have lower alkyl (e.g., phenyl, mesityl, tolyl, etc.), naphthyl, anthryl, and the like, in which the preferred one may be phenyl and naphthyl.

Suitable example of "aroyl" may include benzoyl, toluoyl, naphthoyl, anthrylcarbonyl, and the like,
10 in which the preferred one may be benzoyl and naphthoyl.

Suitable example of "heterocyclic group" and "heterocyclic" moiety may include

unsaturated 3 to 8-membered (more preferably 5 or 6-
15 membered) heteromonocyclic group containing 1 to 4 nitrogen atom(s), for example, pyrrolyl, pyrrolinyl, imidazolyl, pyrazolyl, pyridyl, dihydropyridyl, pyrimidyl, pyrazinyl, pyridazinyl, triazolyl (e.g., 4H-1,2,4-triazolyl, 1H-1,2,3-triazolyl, 2H-1,2,3-triazolyl, etc.),
20 tetrazolyl (e.g., 1H-tetrazolyl, 2H-tetrazolyl, etc.), etc.;

saturated 3 to 8-membered (more preferably 5 or 6-membered heteromonocyclic group containing 1 to 4 nitrogen atom(s), for example, pyrrolidinyl, imidazolidinyl,
25 piperidyl, piperazinyl, etc.;

unsaturated condensed heterocyclic group containing 1 to 4 nitrogen atom(s), for example, indolyl, isoindolyl, indolinyl, indolizinyl, benzimidazolyl, quinolyl, isoquinolyl, indazolyl, benzotriazolyl, etc.;

30 unsaturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing 1 to 2 oxygen atom(s) and 1 to 3 nitrogen atom(s), for example, oxazolyl, isoxazolyl, oxadiazolyl (e.g., 1,2,4-oxadiazolyl, 1,3,4-oxadiazolyl, 1,2,5-oxadiazolyl, etc.),
35 etc.;

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saturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing 1 to 2 oxygen atom(s) and 1 to 3 nitrogen atom(s), for example, morpholinyl, sydnonyl, etc.;

5 unsaturated condensed heterocyclic group containing 1 to 2 oxygen atom(s) and 1 to 3 nitrogen atom(s), for example, benzoxazolyl, benzoxadiazolyl, etc.;

10 unsaturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing 1 to 2 sulfur atom(s) and 1 to 3 nitrogen atom(s), for example, thiazolyl, isothiazolyl, thiadiazolyl (e.g., 1,2,3-thiadiazolyl, 1,2,4-thiadiazolyl, 1,3,4-thiadiazolyl, 1,2,5-thiadiazolyl, etc.), dihydrothiazinyl, etc.;

15 saturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing 1 to 2 sulfur atom(s) and 1 to 3 nitrogen atom(s), for example, thiazolidinyl, etc.;

20 unsaturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing 1 to 2 sulfur atom(s), for example, thienyl, dihydrodithiynyl, dihydrodithionyl, etc.;

 unsaturated condensed heterocyclic group containing 1 to 2 sulfur atom(s) and 1 to 3 nitrogen atom(s), for example, benzothiazolyl, benzothiadiazolyl, etc.;

25 unsaturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing an oxygen atom, for example, furyl, etc.;

30 saturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing an oxygen atom, for example, tetrahydrofuran, tetrahydropyran, etc.;

 unsaturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing an oxygen atom and 1 to 2 sulfur atom(s), for example, dihydrooxathiinyl, etc.;

35 unsaturated condensed heterocyclic group containing 1

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to 2 sulfur atom(s), for example, benzothienyl,
benzodithiiny, etc.;

unsaturated condensed heterocyclic group containing
an oxygen atom and 1 to 2 sulfur atom(s), for example,
5 benzoxathiiny, etc.; and the like.

Suitable example of "halo" may include fluoro,
chloro, bromo and iodo.

10 Suitable example of "lower alkenyloxy" may include
vinyloxy, 1-(or 2-)propenyloxy, 1-(or 2- or 3-)butenyloxy,
1-(or 2- or 3- or 4-)pentenyloxy, 1-(or 2- or 3- or 4- or
5-)hexenyloxy, and the like, in which the preferred one
may be (C₂-C₆)alkenyloxy, and the most preferred one may
be 5-hexenyloxy.

15 Suitable example of "higher alkenyloxy" may include
(C₇-C₂₀)alkenyloxy, in which the preferred one may be 6-
heptenyloxy and 7-octenyloxy.

20 Suitable example of "cyclo(lower)alkyl" may include
cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, and the
like, in which the preferred one may be cyclo(C₄-C₆)alkyl,
and the most preferred one may be cyclohexyl.

Suitable example of "higher alkanoyl" may include
heptanoyl, octanoyl, nonanoyl, decanoyl, undecanoyl,
lauroyl, tridecanoyl, tetradecanoyl, pentadecanoyl,
25 hexadecanoyl, heptadecanoyl, octadecanoyl, nonadecanoyl,
icosanoyl, and the like, in which the preferred one may be
(C₇-C₂₀)alkanoyl, and the most preferred one may be
hexadecanoyl.

30 Suitable example of "ar(lower)alkyl" may include
benzyl, phenethyl, phenylpropyl, phenylbutyl,
phenylpentyl, phenylhexyl, naphthylmethyl, naphthylethyl,
naphthylpropyl, naphthylbutyl, naphthylpentyl,
naphthylhexyl, and the like, in which the preferred one
may be phenyl(C₁-C₄)alkyl, and the most preferred one may
35 be benzyl.

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Suitable example of "protected amino" may include lower or higher alkoxycarbonylamino (e.g., methoxycarbonylamino, ethoxycarbonylamino, t-butoxycarbonylamino, t-pentyloxycarbonylamino, heptyloxycarbonylamino, etc.), ar(lower)alkoxycarbonylamino [e.g., phenyl(lower)alkoxycarbonylamino (e.g., benzyloxycarbonylamino, etc.), etc.], an amino group substituted with a conventional protecting group such as ar(lower)alkyl which may have suitable substituent(s) (e.g., benzyl, trityl, etc.) and the like, in which the preferred one may be phenyl(lower)alkoxycarbonylamino, and the most preferred one may be benzyloxycarbonylamino.

Suitable example of "lower alkanoyl" in the term of "lower alkanoyl substituted with unsaturated 6-membered heteromonocyclic group containing at least one nitrogen atom which may have one or more suitable substituent(s)" can be referred to aforementioned "lower alkanoyl", in which the preferred one may be (C₁-C₄)alkanoyl, and the more preferred one may be formyl.

Suitable example of "unsaturated 6-membered heteromonocyclic group containing at least one nitrogen atom" in the term of "lower alkanoyl substituted with unsaturated 6-membered heteromonocyclic group containing at least one nitrogen atom which may have one or more suitable substituent(s)" may include pyridyl, dihydropyridyl, pyrimidyl, pyrazinyl, pyridazinyl, triazinyl (e.g., 4H-1,2,4-triazinyl, 1H-1,2,3-triazinyl, etc.), tetrazinyl (e.g., 1,2,4,5-tetrazinyl, 1,2,3,4-tetrazinyl, etc.), and the like,

in which the preferred one may be unsaturated 6-membered heteromonocyclic group containing 1 to 3 nitrogen atom(s), and the most preferred one may be pyridyl and pyridazinyl.

Suitable example of "suitable substituent(s)" in the

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term of "lower alkanoyl substituted with unsaturated 6-membered heteromonocyclic groups containing at least one nitrogen atom which may have one or more suitable substituent(s)" can be referred to aforementioned

5 "suitable substituent(s)",

in which the preferred one may be higher alkoxy, higher alkoxy(lower)alkyl, heterocyclic group which may have aryl having higher alkoxy, aryl which may have one or more higher alkoxy, aryl substituted with aryl which may have
10 lower alkoxy, heterocyclic group which may have aryl having lower alkoxy(higher)alkoxy, and heterocyclic group which may have aryl having lower alkoxy, and the more preferred one may be (C₇-C₁₄)alkoxy, (C₇-C₁₄)alkoxy-(C₁-C₄)alkyl, 3 to 8-membered saturated heteromonocyclic
15 group containing at least one nitrogen atom which may have phenyl having 1 to 3 (C₇-C₁₄)alkoxy, phenyl which may have 1 to 3 (C₇-C₁₄)alkoxy, phenyl substituted with phenyl which may have 1 to 3 (C₃-C₆)alkoxy, 3 to 8-membered saturated heteromonocyclic group containing at least one
20 nitrogen atom which may have phenyl having (C₁-C₄)-alkoxy(C₇-C₁₄)alkoxy, and 3 to 8-membered saturated heteromonocyclic group containing at least one nitrogen atom which may have phenyl having 1 to 3 (C₃-C₆)alkoxy, and the most preferred one may be octyloxy,
25 octyloxymethyl, piperazinyl which has phenyl having heptyloxy or octyloxy, phenyl having heptyloxy, phenyl substituted with phenyl having butoxy, piperazinyl which has phenyl having methoxyoctyloxy, and piperazinyl which has phenyl having hexyloxy.

30

Suitable example of "lower alkanoyl" in the term of "lower alkanoyl substituted with 1,2,3,4-tetrahydroisoquinoline which may have one or more suitable substituent(s)" can be referred to aforementioned "lower
35 alkanoyl",

- 15 -

in which the preferred one may be (C₁-C₄)-alkanoyl, and the more preferred one may be formyl.

Suitable example of "suitable substituent(s)" in the term of "lower alkanoyl substituted with 1,2,3,4-tetrahydroisoquinoline which may have one or more suitable substituent(s)" can be referred to aforementioned "suitable substituent(s)",

in which the preferred one may be lower alkoxy, higher alkoxy, lower alkyl, higher alkyl and lower alkoxy carbonyl, and the more preferred one may be (C₇-C₁₄)alkoxy and (C₁-C₄)alkoxy carbonyl, and the most preferred one may be octyloxy and tert-butoxy carbonyl.

Suitable example of "lower alkanoyl" in the term of "lower alkanoyl substituted with unsaturated condensed heterocyclic group containing at least one oxygen atom which may have one or more suitable substituent(s)" can be referred to aforementioned "lower alkanoyl",

in which the preferred one may be (C₁-C₄)alkanoyl, and the more preferred one may be formyl.

Suitable example of "unsaturated condensed heterocyclic group containing at least one oxygen atom" in the term of "lower alkanoyl substituted with unsaturated condensed heterocyclic group containing at least one oxygen atom which may have one or more suitable substituent(s)" may include unsaturated condensed heterocyclic group containing one or more oxygen atom(s) and, optionally, another hetero atom(s) except oxygen atom,

in which the preferred one may be unsaturated condensed heterocyclic group containing 1 to 3 oxygen atom(s), unsaturated condensed heterocyclic group containing 1 to 2 oxygen atom(s) and 1 to 2 sulfur atom(s) and unsaturated condensed heterocyclic group 1 to 3 oxygen atom(s) and 1 to 3 nitrogen atom(s), and the more preferred one may be

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benzo[b]furanyl, isobenzofuranyl, chromenyl, xanthenyl, benzoxazolyl, benzoxadiazolyl, dihydrooxathiinyl, phenoxathiinyl, and the like, and the most preferred one may be benzo[b]furanyl, chromenyl and benzoxazolyl.

5 Suitable example of "suitable substituent(s)" in the term of "lower alkanoyl substituted with unsaturated condensed heterocyclic group containing at least one oxygen atom which may have one or more suitable substituent(s)" can be referred to aforementioned

10 "suitable substituent(s)",

in which the preferred one may be lower alkoxy, higher alkoxy, lower alkyl, higher alkyl, oxo, aryl which may have one or more lower alkoxy, heterocyclic group which may have one or more higher alkoxy, and aryl substituted

15 with aryl which may have one or more lower alkyl, and the more preferred one may be (C₇-C₁₄)alkoxy, (C₁-C₄)alkyl, (C₇-C₁₄)alkyl, oxo, phenyl which may have 1 to 3 (C₃-C₆)alkoxy, unsaturated 6-membered heteromonochclic group containing at least one nitrogen atom which may have

20 1 to 3 (C₇-C₁₄)alkoxy, and phenyl substituted with phenyl which may have 1 to 3 (C₃-C₆)alkyl, and the most preferred one may be octyloxy, methyl, nonyl, oxo, phenyl having hexyloxy, pyridyl having octyloxy, and phenyl substituted with phenyl having hexyl.

25

Suitable example of "lower alkanoyl" in the term of "lower alkanoyl substituted with unsaturated condensed heterocyclic group containing 1 to 3 sulfur atom(s) which may have one or more suitable substituent(s)" can be

30 referred to aforementioned "lower alkanoyl",

in which the preferred one may be (C₁-C₄)alkanoyl, and the more preferred one may be formyl.

Suitable example of "unsaturated condensed heterocyclic group containing 1 to 3 sulfur atom(s)" in

35 the term of "lower alkanoyl substituted with unsaturated

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condensed heterocyclic group containing 1 to 3 sulfur atom(s) which may have one or more suitable substituent(s)" may include unsaturated condensed heterocyclic group containing only 1 to 3 sulfur atom(s),
5 in which the preferred one may be benzothienyl and benzodithienyl, and the most preferred one may be benzothienyl.

Suitable example of "suitable substituent(s)" in the term of "lower alkanoyl substituted with unsaturated condensed heterocyclic group containing 1 to 3 sulfur atom(s) which may have one or more suitable substituent(s)" can be referred to aforementioned "suitable substituent(s)",
10

in which the preferred one may be lower alkoxy, higher alkoxy, lower alkyl and higher alkyl, and more preferred one may be (C₇-C₁₄)alkoxy, and the most preferred one may be octyloxy.
15

Suitable example of "lower alkanoyl" in the term of "lower alkanoyl substituted with unsaturated condensed heterocyclic group containing 2 or more nitrogen atom(s) which may have one or more suitable substituent(s)" can be referred to aforementioned "lower alkanoyl",
20 in which the preferred one may be (C₁-C₄)alkanoyl, and the most preferred one may be formyl.
25

Suitable example of "unsaturated condensed heterocyclic group containing 2 or more nitrogen atom(s)" in the term of "lower alkanoyl substituted with unsaturated condensed heterocyclic group containing 2 or more nitrogen atom(s) which may have one or more suitable substituent(s)" may include 1H-indazolyl, purinyl, phthalazinyl, benzoimidazolyl, naphthyridinyl, quinoxalinyl, quinazolyl, cinnolinyl, pteridinyl, and the like,
30 in which the most preferred one may be benzoimidazolyl.
35

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Suitable example of "suitable substituent(s)" in the term of "lower alkanoyl substituted with unsaturated condensed heterocyclic group containing 2 or more nitrogen atom(s) which may have one or more suitable substituent(s)" can be referred to aforementioned

5 "suitable substituent(s)",

in which the preferred one may be lower alkoxy, higher alkoxy, lower alkyl, higher alkyl, aryl which may have one or more lower alkoxy and aryl which may have one or more

10 higher alkoxy, and the more preferred one may be (C₇-C₁₄)alkyl and phenyl which may have 1 to 3 (C₁-C₆)alkoxy, and the most preferred one may be nonyl and phenyl which may have hexyloxy.

15 Suitable example of "lower alkanoyl" in the term of "lower alkanoyl substituted with saturated 3 to 8-membered heteromonocyclic group containing at least one nitrogen atom which may have one or more suitable substituent(s)" can be referred to aforementioned "lower alkanoyl",

20 in which the preferred one may be (C₁-C₄)alkanoyl, and the more preferred one may be formyl.

Suitable example of "saturated 3 to 8-membered heteromonocyclic group containing at least one nitrogen atom" in the term of "lower alkanoyl substituted with

25 saturated 3 to 8-membered heteromonocyclic group containing at least one nitrogen atom which may have one or more suitable substituent(s)" may include pyrrolidinyl, imidazolidinyl, piperidyl, piperazinyl, pyrazolidinyl, morpholinyl, thiomorpholinyl, and the like,

30 in which the preferred one may be piperidyl and piperazinyl.

Suitable example of "suitable substituent(s)" in the term of "lower alkanoyl substituted with saturated 3 to 8-membered heteromonocyclic group containing at least one

35 nitrogen atom which may have one or more suitable

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substituent(s)" may include lower alkoxy, higher alkoxy, higher alkoxy(lower)alkyl, lower alkyl, higher alkyl, oxo, aryl which may have one or more lower alkoxy, aryl which may have one or more higher alkoxy, 5 aryl which may have one or more lower alkyl, aryl which may have one or more higher alkyl, aroyl which may have one or more lower alkoxy, aroyl which may have one or more higher alkoxy, aroyl which may have one or more lower alkyl, 10 aroyl which may have one or more higher alkyl, and the like,

in which the preferred one may be aryl which may have one or more lower alkoxy, aryl which may have one or more higher alkoxy, 15 aroyl which may have one or more lower alkoxy and aroyl which may have one or more higher alkoxy, and the more preferred one may be aryl which may have 1 to 3 higher alkoxy and aroyl which may have 1 to 3 higher alkoxy, and the much more preferred one may be phenyl 20 which may have 1 to 3 (C₇-C₁₄)alkoxy and naphthoyl which may have 1 to 3 (C₇-C₁₄)alkoxy, and the most preferred one may be phenyl which may have octyloxy and naphthoyl which may have heptyloxy.

25 Sutable example of "ar(lower)alkenoyl" in the term of "ar(lower)alkenoyl substituted with aryl which may have one or more suitable substituent(s)" may include phenyl(lower)alkenoyl (e.g., 3-phenylacryloyl, (2- or 3- or 4-)phenyl-(2- or 3-)butenoyl, 3-phenylmethacryloyl, 30 (2- or 3- or 4- or 5-)phenyl-(2- or 3- or 4-)pentanoyl, (2- or 3- or 4- or 5- or 6-)phenyl-(2- or 3- or 4- or 5-)-hexanoyl, etc.), naphthyl(lower)alkenoyl (e.g., 3-naphthylacryloyl, (2- or 3- or 4-)naphthyl-(2- or 3-)butenoyl, (2- or 3- or 4- or 5-)naphthyl-(2- or 3- or 35 4-)pentanoyl, (2- or 3- or 4- or 5- or 6-)naphthyl-(2- or

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3- or 4- or 5-)hexanoyl, etc.), and the like,
in which the preferred one may be 3-phenylacryloyl and 3-methyl-3-phenylacryloyl.

Suitable example of "suitable substituent(s)" in the
5 term of "ar(lower)alkenoyl substituted with aryl which may have one or more suitable substituent(s)" can be referred to aforementioned "suitable substituent(s)",

in which the preferred one may be lower alkoxy, lower alkyl, higher alkyl, lower alkoxy(lower)alkyl,
10 halo(lower)alkoxy, lower alkenyloxy, halo(higher)alkoxy, and lower alkoxy(higher)alkoxy and the much more preferred one may be (C₁-C₆)alkoxy, (C₁-C₆)alkyl, (C₇-C₁₄)alkyl, (C₁-C₄)alkoxy(C₃-C₆)alkyl, halo(C₃-C₆)alkoxy, (C₃-C₆)alkenyloxy, halo(C₇-C₁₄)alkoxy, and (C₁-C₄)alkoxy(C₇-C₁₄)alkoxy and the most preferred one may be pentyloxy,
15 heptyl, pentyl, methoxyhexyl, fluoroheptyloxy, isohexyloxy, 5-hexenyloxy, haloheptyloxy, methoxyheptyloxy, methoxyoctyloxy, and butyloxy.

Suitable example of "naphthyl(lower)alkenoyl" in the
20 term of "naphthyl(lower)alkenoyl which may have one or more higher alkoxy" may include 3-naphthylacryloyl, (2- or 3- or 4-)naphthyl-(2- or 3-)butenoyl, (2- or 3- or 4- or 5-)naphthyl-(2- or 3- or 4-)pentanoyl, (2- or 3- or 4- or 5- or 6-)naphthyl-(2- or 3- or 4- or 5-)hexanoyl, and the
25 like,

in which the preferred one may be 3-naphthylacryloyl.

Suitable example of "lower alkynoyl" in the term of
30 "lower alkynoyl which may have one or more suitable substituent(s)" may include 2-propynoyl, (2- or 3-)butynoyl, (2- or 3- or 4-)pentynoyl, (2- or 3- or 4- or 5-)hexynoyl, and the like,
in which the preferred one may be 2-propynoyl.

35 Suitable example of "suitable substituent(s)" in the

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term of "lower alkynoyl which may have one or more suitable substituent(s)" can be referred to aforementioned "suitable substituent(s)",

in which the preferred one may be aryl which may have one or more lower alkoxy, aryl which may have one or more higher alkoxy, aryl substituted with aryl which may have one or more lower alkyl and aryl substituted with aryl which may have one or more higher alkyl, and the more preferred one may be aryl substituted with aryl which may have 1 to 3 lower alkyl and aryl which may have 1 to 3 higher alkoxy, and the much more preferred one may be phenyl substituted with phenyl which may have 1 to 3 (C₁-C₆)alkyl and phenyl which may have 1 to 3 (C₇-C₁₄)alkoxy, and the most preferred one may be phenyl substituted with phenyl which may have pentyl and naphthyl which may have heptyloxy.

Suitable example of "ar(C₂-C₆)alkanoyl" in the term of "ar(C₂-C₆)alkanoyl substituted with aryl having one or more suitable substituent(s), in which ar(C₂-C₆)alkanoyl may have one or more suitable substituent(s)" may include phenyl(C₂-C₆)alkanoyl [e.g., phenylacetyl, (2- or 3-)-phenylpropanoyl, (2- or 3- or 4-)phenylbutanoyl, (2- or 3- or 4- or 5-)phenylpentanoyl, (2- or 3- or 4- or 5- or 6-)phenylhexanoyl, etc.], naphthyl(C₂-C₆)alkanoyl [e.g. naphthylacetyl, (2- or 3-)naphthylpropanoyl, (2- or 3- or 4-)naphthylbutanoyl, (2- or 3- or 4- or 5-)naphthylpentanoyl, (2- or 3- or 4- or 5- or 6-)naphthylhexanoyl, etc.], and the like,

in which the preferred one may be 2-phenylacetyl and 3-phenylpropanoyl.

Suitable example of "suitable substituent(s)" in the term of "ar(C₂-C₆)alkanoyl substituted with aryl having one or more suitable substituent(s), in which ar(C₂-C₆)alkanoyl may have one or more suitable substituent(s)" may

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include lower alkoxy, higher alkoxy, lower alkyl, higher alkyl, higher alkoxy(lower)alkyl, oxo, aryl having one or more lower alkoxy, aryl having one or more higher alkoxy, aryl having one or more lower alkyl, aryl having one or more higher alkyl, aryl substituted with aryl having one or more lower alkoxy, aryl substituted with aryl having one or more higher alkoxy, aryl substituted with aryl having one or more lower alkyl, aryl substituted with aryl having one or more higher alkyl, aryl having one or more lower alkoxy(lower)alkoxy and the like,

in which the preferred one may be lower alkoxy, higher alkoxy, lower alkyl, higher alkyl, and phenyl having 1 to 3 lower alkoxy(lower)alkoxy and the much more preferred one may be (C₁-C₆)alkoxy, (C₁-C₆)alkyl, (C₇-C₁₄)alkyl and phenyl having (C₁-C₄)alkoxy(C₃-C₆)alkoxy and the most preferred one may be pentyloxy, pentyl, heptyl and phenyl having methoxypentyloxy.

Suitable example of "suitable substituent(s)" in the term of "in which ar(C₂-C₆)alkanoyl may have one or more suitable substituent(s)" may be hydroxy, oxo, amino and aforementioned "protected amino".

Suitable example of "(C₂-C₆)alkanoyl" in the term of "(C₂-C₆)alkanoyl substituted with naphthyl having higher alkoxy" may include acetyl, propanoyl, butanoyl, pentanoyl, hexanoyl, and the like,

in which the preferred one may be propanoyl.

Suitable example of "higher alkoxy" in the term of "(C₂-C₆)alkanoyl substituted with naphthyl having higher alkoxy" can be referred to aforementioned "higher alkoxy", in which the preferred one may be (C₇-C₁₄)alkoxy, and the most preferred one may be heptyloxy.

Suitable example of "aroyl" in the term of "aroyl substituted with heterocyclic group which may have one or

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more suitable substituent(s), in which aroyl may have one or more suitable substituent(s)" may include benzoyl, toluoyl, naphthoyl, and the like,

in which the preferred one may be benzoyl.

5

Suitable example of "heterocyclic group" in the term of "aroyl substituted with heterocyclic group which may have one or more suitable substituent(s), in which aroyl may have one or more suitable substituent(s)" may include
10 unsaturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing 1 to 4 nitrogen atom(s), for example, pyrrolyl, pyrrolinyl, imidazolyl, pyrazolyl, pyridyl, dihydropyridyl, pyrimidyl, pyrazinyl, pyridazinyl, triazolyl (e.g., 4H-1,2,4-
15 triazolyl, 1H-1,2,3-triazolyl, 2H-1,2,3-triazolyl, etc.), tetrazolyl (e.g., 1H-tetrazolyl, 2H-tetrazolyl, etc.), etc.;

saturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing 1 to 4
20 nitrogen atom(s), for example, pyrrolidinyl, imidazolidinyl, piperidyl, piperazinyl, etc.;

unsaturated condensed heterocyclic group containing 1 to 4 nitrogen atom(s), for example, indolyl, isoindolyl, indolinyl, indolizinyl, benzimidazolyl, quinolyl,
25 isoquinolyl, indazolyl, benzotriazolyl, etc.;

unsaturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing 1 to 2 oxygen atom(s) and 1 to 3 nitrogen atom(s), for example, oxazolyl, isoxazolyl, oxadiazolyl (e.g.,
30 1,2,4-oxadiazolyl, 1,3,4-oxadiazolyl, 1,2,5-oxadiazolyl, etc.), etc.;

saturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing 1 to 2 oxygen atom(s) and 1 to 3 nitrogen atom(s), for example,
35 morpholinyl, sydnonyl, etc.;

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unsaturated condensed heterocyclic group containing 1 to 2 oxygen atom(s) and 1 to 3 nitrogen atom(s), for example, benzoxazolyl, benzoxadiazolyl, etc.;

5 unsaturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing 1 to 2 sulfur atom(s) and 1 to 3 nitrogen atom(s), for example, thiazolyl, isothiazolyl, thiadiazolyl (e.g., 1,2,3-thiadiazolyl, 1,2,4-thiadiazolyl, 1,3,4-thiadiazolyl, 1,2,5-thiadiazolyl, etc.),
10 dihydrothiazinyl, etc.;

saturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing 1 to 2 sulfur atom(s) and 1 to 3 nitrogen atom(s), for example, thiazolidinyl, etc.;

15 unsaturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing 1 to 2 sulfur atom(s), for example, thienyl, dihydrodithiynyl, dihydrodithionyl, etc.;

20 unsaturated condensed heterocyclic group containing 1 to 2 sulfur atom(s) and 1 to 3 nitrogen atom(s), for example, benzothiazolyl, benzothiadiaazolyl, etc.;

unsaturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing an oxygen atom, for example, furyl, etc.;

25 saturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing an oxygen atom, for example, tetrahydrofuran, tetrahydropyran, etc.;

30 unsaturated 3 to 8-membered (more preferably 5 or 6-membered) heteromonocyclic group containing an oxygen atom and 1 to 2 sulfur atom(s), for example, dihydrooxathiinyl, etc.;

unsaturated condensed heterocyclic group containing 1 to 2 sulfur atom(s), for example, benzothienyl, benzodithiynyl, etc.;

35 unsaturated condensed heterocyclic group containing

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an oxygen atom and 1 to 2 sulfur atom(s), for example, benzoxathiinyl, etc.; and the like,

in which the preferred one may be saturated 3 to 8-membered heteromonocyclic group containing 1 to 4 nitrogen atom(s), unsaturated 3 to 8-membered heteromonocyclic group containing 1 to 2 oxygen atom(s) and 1 to 3 nitrogen atom(s),

unsaturated 3 to 8-membered heteromonocyclic group containing 1 to 4 nitrogen atom(s), and

unsaturated 3 to 8-membered heteromonocyclic group containing 1 to 2 sulfur atom(s) and 1 to 3 nitrogen atom(s), and the most preferred one may be piperazinyl, isoxazolyl, oxadiazolyl, thiadiazolyl, pyrazolyl, piperidyl, oxazolyl and pyrimidyl.

Suitable example of "suitable substituent(s)" in the term of "aroyl substituted with heterocyclic group which may have one or more suitable substituent(s), in which aroyl may have one or more suitable substituent(s)", can be referred to aforementioned "suitable substituent(s)",

in which the preferred one may be aryl which may have 1 to 3 higher alkoxy, aryl which may have 1 to 3 lower alkoxy, higher alkyl, heterocyclic group, aryl which may have 1 to 3 lower alkoxy(higher)alkoxy, aryl which may have higher alkenyloxy, heterocyclic group which may have aryl having lower alkoxy, cyclo(lower)alkyl which may have aryl, aryl which may have 1 to 3 lower alkyl, aryl which may have cyclo(lower)alkyl, aryl which may have higher alkenyloxy, aryl substituted with heterocyclic group which may have lower alkyl and oxo, cyclo(lower)alkyl which may have lower alkyl, aryl substituted with aryl which may have 1 to 3 lower alkoxy, and aryl which may have heterocyclic group, and the more preferred one may be phenyl which may have 1 to 3 (C₇-C₁₄)alkoxy, phenyl which may have 1 to 3 (C₃-C₆)alkoxy, (C₇-C₁₄)alkyl, saturated 3

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to 8-membered heteromonocyclic group containing 1 to 4 nitrogen atom(s), phenyl which may have 1 to 3 (C₁-C₄)alkoxy (C₇-C₁₄)alkoxy, phenyl which may have (C₇-C₁₄)alkenyloxy, saturated 3 to 8-membered heteromonocyclic group containing 1 to 4 nitrogen atom(s) substituted with phenyl having (C₃-C₆)alkoxy, cyclo(C₃-C₆)alkyl which may have phenyl, phenyl which may have 1 to 3 (C₃-C₆)alkyl, phenyl which may have cyclo(C₃-C₆)alkyl, phenyl which may have (C₇-C₁₄)alkenyloxy, phenyl substituted with heterocyclic group which may have (C₃-C₆)alkyl and oxo, cyclo(C₃-C₆)alkyl which may have (C₃-C₆)alkyl, phenyl substituted with phenyl which may have 1 to 3 (C₁-C₄)alkoxy, and phenyl which may have 3 to 8-membered heteromonocyclic group containing 1 to 4 nitrogen atom(s), and the most preferred one may be phenyl having octyloxy, phenyl having pentyloxy, phenyl having hexyloxy, heptyl, piperidyl, phenyl having isohexyloxy, phenyl having heptyloxy, phenyl having methoxyheptyloxy, phenyl having methoxyoctyloxy, phenyl having 6-heptenyloxy, piperidyl substituted with phenyl having hexyloxy, cyclohexyl having phenyl, phenyl having hexyl, phenyl having cyclohexyl, phenyl having 7-octenyloxy, phenyl substituted with triazolyl having lower alkyl and oxo, cyclohexyl having pentyl, phenyl having methoxyoctyloxy, nonyl, phenyl substituted with phenyl having propoxy, and phenyl having piperidine.

Suitable example of "suitable substituent(s)" in the term of "in which aroyl may have one or more suitable substituent(s)" may be halogen, in which the preferred one may be fluoro and chloro.

Suitable example of "aroyl" in the term of "aroyl substituted with aryl having heterocyclic(higher)alkoxy, in which heterocyclic group may have one or more suitable substituent(s)" may include benzoyl, toluoyl, naphthoyl,

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anthrylcarbonyl and the like,

in which the preferred one may be benzoyl.

Suitable example of "heterocyclic" moiety in the term of "aroyl substituted with aryl having

5 heterocyclic(higher)alkoxy, in which heterocyclic group may have one or more suitable substituent(s)" can be referred to the ones as exemplified before for

"heterocyclic group" in the term of "aroyl substituted with heterocyclic group which may have one or more

10 suitable substituent(s)",

in which the preferred one may be unsaturated 3 to 8-membered heteromonocyclic group containing 1 to 4 nitrogen atom(s) and saturated 3 to 8-membered heteromonocyclic group containing 1 to 2 oxygen atom(s) and 1 to 3 nitrogen atom(s), and the most preferred one may be triazolyl, tetrazolyl and morpholinyl.

15 Suitable example of "(higher)alkoxy" moiety in the term of "aroyl substituted with aryl having heterocyclic(higher)alkoxy, in which heterocyclic group may have one or more suitable substituent(s)" can be referred to aforementioned "higher alkoxy",

in which the preferred one may be (C₇-C₁₄)alkoxy, and the most preferred one may be octyloxy.

20 Suitable example of "aryl" in the term of "aroyl substituted with aryl having heterocyclic(higher)alkoxy, in which heterocyclic group may have one or more suitable substituent(s)" can be referred to aforementioned "aryl", in which the preferred one may be phenyl.

25 Suitable example of "suitable substituent(s)" in the term of "in which heterocyclic group may have one or more suitable substituent(s)" may be lower alkyl, in which the preferred one may be methyl.

30 Suitable example of "aroyl" in the term of "aroyl substituted with aryl having lower alkoxy(higher)alkoxy"

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may include benzoyl, toluoyl, naphthoyl, anthrylcarbonyl and the like,

in which the preferred one may be benzoyl.

Suitable example of "aryl" in the term of "aroyl
5 substituted with aryl having lower alkoxy(higher)alkoxy"
can be referred to aforementioned "aryl",

in which the preferred one may be phenyl.

Suitable example of "lower alkoxy(higher)alkoxy" in
the term of "aroyl substituted with aryl having lower
10 alkoxy(higher)alkoxy" may be methoxyheptyloxy,
methoxyoctyloxy, methoxynonyloxy, methoxydecyloxy,
ethoxyheptyloxy, ethoxyoctyloxy, ethoxynonyloxy,
ethoxydecyloxy, ethoxyundecyloxy, propoxyundecyloxy,
butoxydodecyloxy, pentyloxytridecyloxy,
15 hexyloxytetradecyloxy, propoxyheptyloxy, propoxyoctyloxy,
propoxynonyloxy, butoxydecyloxy, or the like, in which the
preferred one may be (C₁-C₆)alkoxy(C₇-C₁₄)alkoxy, and the
more preferred one may be methoxyoctyloxy.

20 Suitable example of "aroyl" in the term of "aroyl
substituted with aryl having lower alkenyl(lower)alkoxy"
may include benzoyl, toluoyl, naphthoyl, anthrylcarbonyl
and the like,

in which the preferred one may be benzoyl.

25 Suitable example of "aryl" in the term of "aroyl
substituted with aryl having lower alkenyl(lower)alkoxy"
can be referred to aforementioned "aryl",

in which the preferred one may be phenyl.

Suitable example of "lower alkenyl(lower)alkoxy" in
30 the term of "aroyl substituted with aryl having lower
alkenyl(lower)alkoxy" may be vinylmethoxy, vinylethoxy,
vinylpropoxy, vinylbutoxy, vinylpentyloxy, vinylhexyloxy,
1-(or 2-)propenylmethoxy, 1-(or 2-)propenylethoxy, 1-(or
2-)propenylpropoxy, 1-(or 2-)propenylbutoxy, 1-(or 2-)-
35 propenylpentyloxy, 1-(or 2-)propenylhexyloxy, 1-(or 2- or

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3-)butenylbutoxy, 1-(or 2- or 3-)butenylhexyloxy, 1-(or 2-
or 3- or 4-)pentenylpentyloxy, 1-(or 2- or 3- or 4-)-
pentenylhexyloxy, 1-(or 2- or 3- or 4- or 5-)-
hexenylbutoxy, 1-(or 2- or 3- or 4- or 5-)hexenylhexyloxy,
5 or the like,

in which the preferred one may be (C₂-C₆)alkenyl(C₁-
C₆)alkoxy, and the more preferred one may be
vinylhexyloxy.

10 Suitable example of "aroyl substituted with 2 lower
alkoxy" may include benzoyl substituted with 2 lower
alkoxy and naphthoyl substituted with 2 lower alkoxy,
in which the preferred one may be benzoyl substituted
with 2 (C₁-C₆)alkoxy, and the most preferred one may be
15 benzoyl substituted with 2 pentyloxy.

 Suitable example of "aroyl substituted with aryl
having lower alkyl" may include benzoyl substituted with
phenyl having lower alkyl, benzoyl substituted with
20 naphthyl having lower alkyl, naphthoyl substituted with
phenyl having lower alkyl, naphthoyl substituted with
naphthyl having lower alkyl, and the like,
in which the preferred one may be benzoyl substituted
with phenyl having (C₁-C₆)alkyl, and the most preferred
25 one may be benzoyl substituted with phenyl having hexyl
and benzoyl substituted with phenyl having pentyl.

 Suitable example of "aroyl substituted with aryl
having higher alkyl" may include benzoyl substituted with
30 phenyl having higher alkyl, benzoyl substituted with
naphthyl having higher alkyl, naphthoyl substituted with
phenyl having higher alkyl, naphthoyl substituted with
naphthyl having higher alkyl, and the like,
in which the preferred one may be benzoyl substituted
35 with phenyl having (C₇-C₁₄)alkyl, and the most preferred

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one may be benzoyl substituted with phenyl having heptyl.

Suitable example of "aryloxy" moiety in the term of "aryloxy(lower)alkanoyl which may have one or more
5 suitable substituent(s)" may include phenoxy, mesityloxy, tolyloxy, naphthyloxy, anthryloxy, and the like, in which the preferred one may be phenoxy.

Suitable example of "lower alkanoyl" moiety in the term of "aryloxy(lower)alkanoyl which may have one or more
10 suitable substituent(s)" can be referred to aforementioned "lower alkanoyl",

in which the preferred one may be formyl, acetyl, 2,2-dimethylacetyl, propionyl, butyryl, isobutyryl and pentanoyl, hexanoyl, and the more preferred one may be
15 (C₁-C₆)alkanoyl, and the much more preferred one may be formyl, acetyl, propionyl and 2,2-dimethylacetyl.

Suitable example of "suitable substituent(s)" in the term of "aryloxy(lower)alkanoyl which may have one or more
20 suitable substituent(s)" can be referred to aforementioned "suitable substituent(s)",

in which the preferred one may be (C₇-C₁₄)alkoxy, and the more preferred one may be octyloxy.

Suitable example of "ar(lower)alkoxy" moiety in the
25 term of "ar(lower)alkoxy(lower)alkanoyl which may have one or more suitable substituent(s)" may include phenyl(lower)alkoxy [e.g., phenylmethoxy, (1- or 2-)-phenylethoxy, phenylpropoxy, 2-phenyl-1-methylpropoxy, 3-phenyl-2,2-dimethylpropoxy,
30 (1- or 2- or 3- or 4-)phenylbutoxy, (1- or 2- or 3- or 4- or 5-)phenylpentyloxy, (1- or 2- or 3- or 4- or 5- or 6-phenylhexyloxy, etc.], naphthyl(lower)alkoxy [e.g. naphthylmethoxy, (1- or 2-)naphthylethoxy, 1-naphthylpropoxy, 2-naphthyl-1-methylpropoxy, 3-naphthyl-
35 2,2-dimethylpropoxy, (1- or 2- or 3- or 4-)naphthylbutoxy,

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(1- or 2- or 3- or 4- or 5-)naphthylpentyloxy, (1- or 2- or 3- or 4- or 5- or 6-)naphthylhexyloxy, etc.], and the like,

5 in which the preferred one may be naphthyl(C₁-C₄)alkoxy, and the more preferred one may be naphthylmethoxy.

Suitable example of "(lower)alkanoyl" moiety in the term of "ar(lower)alkoxy(lower)alkanoyl which may have one or more suitable substituent(s)" can be referred to aforementioned "lower alkanoyl",

10 in which the preferred one may be (C₁-C₄)alkanoyl, and the more preferred one may be formyl.

Suitable example of "suitable substituent(s)" in the term of "ar(lower)alkoxy(lower)alkanoyl which may have one or more suitable substituent(s)" can be referred to

15 aforementioned "suitable substituent(s)",
in which the preferred one may be lower alkoxy, higher alkoxy, lower alkyl and higher alkyl, and the more preferred one may be higher alkoxy, and the much more preferred one may be (C₇-C₁₄)alkoxy, and the most

20 preferred one may be heptyloxy.

Suitable example of "arylamino" moiety in the term of "arylamino(lower)alkanoyl which may have one or more suitable substituent(s)" may include phenylamino, mesitylamino, tolylamino, naphthylamino, anthrylamino and the like,

25 in which the preferred one may be phenylamino and naphthylamino.

Suitable example of "lower alkanoyl" moiety in the term of "arylamino(lower)alkanoyl which may have one or more suitable substituent(s)" can be referred to aforementioned "lower alkanoyl",

30 in which the preferred one may be (C₁-C₄)alkanoyl, and the more preferred one may be formyl.

35 Suitable example of "suitable substituent(s)" in the

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term of "arylamino(lower)alkanoyl which may have one or more suitable substituent(s)" can be referred to aforementioned "suitable substituent(s)",

5 in which the preferred one may be lower alkoxy, higher alkoxy, lower alkyl, higher alkyl, aryl which may have 1 to 3 lower alkoxy and aryl which may have 1 to 3 higher alkoxy, and the more preferred one may be (C₇-C₁₄)alkoxy, and phenyl which may have 1 to 3 (C₇-C₁₄)alkoxy, and the most preferred one may be heptyloxy and phenyl which may
10 have heptyloxy.

Suitable example of "lower alkanoyl" in the term of "lower alkanoyl substituted with pyrazolyl which has lower alkyl and aryl having higher alkoxy" can be referred to aforementioned "lower alkanoyl", in which the preferred
15 one may be (C₁-C₄)alkanoyl, and the most preferred one may be formyl.

Suitable example of "lower alkyl" in the term of "lower alkanoyl substituted with pyrazolyl which has lower alkyl and aryl having higher alkoxy" can be referred to aforementioned "lower alkyl", in which the preferred one
20 may be (C₁-C₄)alkyl, and the most preferred one may be methyl.

Suitable example of "aryl" in the term of "lower alkanoyl substituted with pyrazolyl which has lower alkyl and aryl having higher alkoxy" can be referred to aforementioned "aryl", in which the preferred one may be
25 phenyl.

Suitable example of "higher alkoxy" in the term of "lower alkanoyl substituted with pyrazolyl which has lower alkyl and aryl having higher alkoxy" can be referred to aforementioned "higher alkoxy", in which the preferred one
30 may be (C₇-C₁₄)alkoxy, and the most preferred one may be octyloxy.

35 Suitable example of "lower alkoxy(higher)alkanoyl" in

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the term of "lower alkoxy(higher)alkanoyl, in which higher alkanoyl may have one or more suitable substituent(s)" may be (C₁-C₄)alkoxy(C₇-C₂₀)alkanoyl, in which the preferred one may be methoxyoctadecanoyl.

5 Suitable example of "suitable substituent(s)" in the term of "lower alkoxy(higher)alkanoyl, in which higher alkanoyl may have one or more suitable substituent(s)" may be amino and aforementioned "protected amino", in which the preferred one may be amino and
10 ar(lower)alkoxycarbonylamino, and the most preferred one may be amino and benzyloxycarbonylamino.

 Suitable example of "aroyl" in the term of "aroyl substituted with aryl having heterocyclicoxy, in which
15 heterocyclicoxy may have one or more suitable substituent(s)" can be referred to aforementioned "aroyl", in which the preferred one may be benzoyl.

 Suitable example of "aryl" in the term of "aroyl substituted with aryl having heterocyclicoxy, in which
20 heterocyclicoxy may have one or more suitable substituent(s)" can be referred to aforementioned "aryl", in which the preferred one may be phenyl.

 Suitable example of "heterocyclic" moiety in the term of "aroyl substituted with aryl having heterocyclicoxy, in
25 which heterocyclicoxy may have one or more suitable substituent(s)" can be referred to aforementioned "heterocyclic" moiety, in which the preferred one may be unsaturated 3 to 8-membered heteromonocyclic group containing 1 to 4 nitrogen atom(s), and the most preferred
30 one may be pyridazinyl.

 Suitable example of "suitable substituent(s)" in the term of "aroyl substituted with aryl having
heterocyclicoxy, in which heterocyclicoxy may have one or
35 more suitable substituent(s)" may be aryl, in which the preferred one may be phenyl.

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Suitable example of "aroyl" in the term of "aroyl substituted with cyclo(lower)alkyl having lower alkyl" can be referred to aforementioned "aroyl", in which the preferred one may be benzoyl.

5 Suitable example of "cyclo(lower)alkyl" in the term of "aroyl substituted with cyclo(lower)alkyl having lower alkyl" can be referred to aforementioned "cyclo(lower)alkyl", in which the preferred one may be cyclohexyl.

10 Suitable example of "lower alkyl" in the term of "aroyl substituted with cyclo(lower)alkyl having lower alkyl" can be referred to aforementioned "lower alkyl", in which the preferred one may be pentyl.

15 Suitable example of "higher alkyl" in the term of "indolylcarbonyl having higher alkyl" can be referred to aforementioned "higher alkyl", in which the preferred one may be decyl.

20 Suitable example of "lower alkyl" in the term of "naphthoyl having lower alkyl" can be referred to aforementioned "lower alkyl", in which the preferred one may be hexyl.

25 Suitable example of "higher alkyl" in the term of "naphthoyl having higher alkyl" can be referred to aforementioned "higher alkyl", in which the preferred one may be heptyl.

30 Suitable example of "lower alkoxy(higher)alkoxy" in the term of "naphthoyl having lower alkoxy(higher)alkoxy" may be (C₁-C₄)alkoxy(C₇-C₁₄)alkoxy, in which the preferred one may be methoxyoctyloxy.

35 Suitable example of "aroyl" in the term of "aroyl

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substituted with aryl having lower
alkoxy(lower)alkoxy(higher)alkoxy", "aroyle substituted
with aryl having lower alkoxy(lower)alkoxy", "aroyle
substituted with aryl which has aryl having lower alkoxy",
5 "aroyle substituted with aryl which has aryl having lower
alkoxy(lower)alkoxy", "aroyle substituted with aryl having
heterocyclicoxy(higher)alkoxy", "aroyle substituted with
aryl having aryloxy(lower)alkoxy" and "aroyle substituted
with aryl having heterocycliccarbonyl(higher)alkoxy" can
10 be referred to aforementioned "aroyle", in which the
preferred one may be benzoyl.

Suitable example of "aryle" in abovementioned terms
can be referred to aforementioned "aryle", in which the
preferred one may be phenyl.

15

Suitable example of "lower alkoxy(lower)alkoxy-
(higher)alkoxy" in the term of "aroyle substituted with
aryl having lower alkoxy(lower)alkoxy(higher)alkoxy" may
be (C₁-C₄)alkoxy(C₁-C₄)alkoxy(C₇-C₁₄)alkoxy, in which the
20 preferred one may be ethoxyethoxyoctyloxy.

20

Suitable example of "lower alkoxy(lower)alkoxy" in
the term of "aroyle substituted with aryl having lower
alkoxy(lower)alkoxy" may be (C₁-C₄)alkoxy(C₃-C₆)alkoxy, in
25 which the preferred one may be propoxyhexyloxy.

25

Suitable example of "lower alkoxy" in the term of
"aroyle substituted with aryl which has phenyl having lower
alkoxy" may be (C₃-C₆)alkoxy, in which the preferred one
30 may be butoxy.

30

Suitable example of "lower alkoxy(lower)alkoxy" in
the term of "aroyle substituted with aryl which has phenyl
having lower alkoxy(lower)alkoxy" may be (C₁-C₄)alkoxy-
35 (C₃-C₆)alkoxy, in which the preferred one may be

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methoxypentyloxy and methoxyhexyloxy.

Suitable example of "heterocyclic" moiety in the term of "aroyl substituted with aryl having
5 heterocyclicoxy(higher)alkoxy" can be referred to aforementioned "heterocyclic" moiety, in which the preferred one may be saturated 3 to 8-membered heteromonocyclic group containing an oxygen atom, and the most preferred one may be tetrahydropyranyl.

10 Suitable example of "higher alkoxy" moiety in the term of "aroyl substituted with aryl having heterocyclicoxy(higher)alkoxy" may be (C₇-C₁₄)alkoxy, in which the preferred one may be octyloxy.

15 Suitable example of "aryloxy(lower)alkoxy" in the term of "aroyl substituted with aryl having aryloxy(lower)alkoxy" may be phenoxy(C₃-C₆)alkoxy, in which the preferred one may be phenoxypentyloxy.

20 Suitable example of "heterocyclic" moiety in the term of "aroyl substituted with aryl having heterocycliccarbonyl(higher)alkoxy" can be referred to aforementioned "heterocyclic" moiety, in which the preferred one may be saturated 3 to 8-membered
25 heteromonocyclic group containing 1 to 4 nitrogen atom(s), and the most preferred one may be piperidyl.

Suitable example of "higher alkoxy" moiety in the term of "aroyl substituted with aryl having heterocycliccarbonyl(higher)alkoxy" can be referred to
30 aforementioned "higher alkoxy", in which the preferred one may be (C₇-C₁₄)alkoxy, and the most preferred one may be heptyloxy.

Suitable example of "lower alkanoyl" in the term of
35 "lower alkanoyl substituted with oxazolyl which has aryl

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having higher alkoxy" can be referred to aforementioned "lower alkanoyl", in which the preferred one may be (C₁-C₄)alkanoyl, and the most preferred one may be formyl.

5 Suitable example of "aryl" in the term of "lower alkanoyl substituted with oxazolyl which has aryl having higher alkoxy" can be referred to aforementioned "aryl", in which the preferred one may be phenyl.

10 Suitable example of "higher alkoxy" in the term of "lower alkanoyl substituted with oxazolyl which has aryl having higher alkoxy" can be referred to aforementioned "higher alkoxy", in which the preferred one may be (C₇-C₁₄)alkoxy, and the most preferred one may be octyloxy.

15 Suitable example of "lower alkanoyl" in the term of "lower alkanoyl substituted with furyl which has aryl substituted with aryl having lower alkoxy" can be referred to aforementioned "lower alkanoyl", in which the preferred one may be (C₁-C₄)alkanoyl, and the most preferred one may be formyl.

20 Suitable example of "aryl" in the term of "lower alkanoyl substituted with furyl which has aryl substituted with aryl having lower alkoxy" can be referred to aforementioned "aryl", in which the preferred one may be phenyl.

25 Suitable example of "lower alkoxy" in the term of "lower alkanoyl substituted with furyl which has aryl substituted with aryl having lower alkoxy" can be referred to aforementioned "lower alkoxy", in which the preferred one may be (C₁-C₄)alkoxy, and the most preferred one may be butoxy.

30 Suitable example of "lower alkanoyl" in the term of "lower alkanoyl substituted with triazolyl which has oxo and aryl having higher alkyl" can be referred to

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aforementioned "lower alkanoyl", in which the preferred one may be (C₁-C₄)alkanoyl, and the most preferred one may be formyl.

5 Suitable example of "higher alkyl" in the term of "lower alkanoyl substituted with triazolyl which has oxo and aryl having higher alkyl" can be referred to aforementioned "higher alkyl", in which the preferred one may be (C₇-C₁₄)alkyl, and the most preferred one may be octyl.

10 Suitable example of "aryl" in the term of "lower alkanoyl substituted with triazolyl which has oxo and aryl having higher alkyl" can be referred to aforementioned "aryl", in which the preferred one may be phenyl.

15 Suitable example of "higher alkanoyl" in the term of "higher alkanoyl having hydroxy" can be referred to aforementioned "higher alkanoyl", in which the preferred one may be (C₇-C₂₀)alkanoyl, and the most preferred one may be hexadecanoyl.

20 Suitable example of "higher alkanoyl" in the term of "higher alkanoyl having ar(lower)alkyl and hydroxy" can be referred to aforementioned "higher alkanoyl", in which the preferred one may be (C₇-C₂₀)alkanoyl, and the most preferred one may be hexadecanoyl.

25 Suitable example of "ar(lower)alkyl" in the term of "higher alkanoyl having ar(lower)alkyl and hydroxy" can be referred to aforementioned "ar(lower)alkyl", in which the preferred one may be phenyl(C₁-C₄)alkyl, and the most preferred one may be benzyl.

30 Suitable example of "(C₂-C₆)alkanoyl" in the terms of "(C₂-C₆)alkanoyl substituted with aryl having higher alkoxy, in which (C₂-C₆)alkanoyl may have amino or protected amino" may include acetyl, propanoyl, butanoyl,

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pentanoyl, hexanoyl, and the like, in which the preferred one may be acetyl and propanoyl.

Suitable example of "aryl" in the term of "(C₂-C₆)alkanoyl substituted with aryl having higher alkoxy, in which (C₂-C₆)alkanoyl may have amino or protected amino" can be referred to aforementioned "aryl", in which the preferred one may be phenyl.

Suitable example of "higher alkoxy" in the term of "(C₂-C₆)alkanoyl substituted with aryl having higher alkoxy, in which (C₂-C₆)alkanoyl may have amino or protected amino" can be referred to aforementioned "higher alkoxy", in which the preferred one may be (C₇-C₁₄)alkoxy, and the most preferred one may be octyloxy.

Suitable example of "protected amino" in the term of "(C₂-C₆)alkanoyl substituted with aryl having higher alkoxy, in which (C₂-C₆)alkanoyl may have amino or protected amino" can be referred to aforementioned "protected amino", in which the preferred one may be ar(lower)alkoxycarbonylamino, and the most preferred one may be benzyloxycarbonylamino.

The process for preparing the object polypeptide compound [I] or a salt thereof of the present invention are explained in detail in the following.

Process 1

The object polypeptide compound [I] or a salt thereof can be prepared by reacting the compound [II] or its reactive derivative at the amino group or a salt thereof with the compound [III] or its reactive derivative at the carboxy group or a salt thereof.

Suitable reactive derivative at the carboxy group of the compound [III] may include an acid halide, an acid anhydride, an activated amide, an activated ester, and the like. Suitable examples of the reactive derivatives may

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be an acid chloride; an acid azide; a mixed acid anhydride with an acid such as substituted phosphoric acid [e.g., dialkylphosphoric acid, phenylphosphoric acid, diphenylphosphoric acid, dibenzylphosphoric acid, halogenated phosphoric acid, etc.], dialkylphosphorous acid, sulfurous acid, thiosulfuric acid, sulfuric acid, sulfonic acid [e.g., methanesulfonic acid, etc.], aliphatic carboxylic acid [e.g., acetic acid, propionic acid, butyric acid, isobutyric acid, pivalic acid, pentanoic acid, isopentanoic acid, 2-ethylbutyric acid, trichloroacetic acid, etc.]; or aromatic carboxylic acid [e.g., benzoic acid, etc.]; a symmetrical acid anhydride; an activated amide with imidazole, 4-substituted imidazole, dimethylpyrazole, triazole, tetrazole or 1-hydroxy-1H-benzotriazole; or an activated ester [e.g., cyanomethyl ester, methoxymethyl ester, dimethyliminomethyl [(CH₃)₂N⁺=CH-] ester, vinyl ester, propargyl ester, p-nitrophenyl ester, 2,4-dinitrophenyl ester, trichlorophenyl ester, pentachlorophenyl ester, mesylphenyl ester, phenylazophenyl ester, phenyl thioester, p-nitrophenyl thioester, p-cresyl thioester, carboxymethyl thioester, pyranyl ester, pyridyl ester, piperidyl ester, 8-quinolyl thioester, etc.], or an ester with a N-hydroxy compound [e.g. N,N-dimethylhydroxylamine, 1-hydroxy-2-(1H)-pyridone, N-hydroxysuccinimide, N-hydroxyphthalimide, 1-hydroxy-1H-benzotriazole, etc.], and the like. These reactive derivatives can optionally be selected from them according to the mind of the compound [III] to be used.

Suitable salts of the compound [III] and its reactive derivative can be referred to the ones as exemplified for the object polypeptide compound [I].

The reaction is usually carried out in a conventional solvent such as water, alcohol [e.g., methanol, ethanol,

etc.], acetone, dioxane, acetonitrile, chloroform, methylene chloride, ethylene chloride, tetrahydrofuran, ethyl acetate, N,N-dimethylformamide, pyridine or any other organic solvent which does not adversely influence the reaction. These conventional solvent may also be used in a mixture with water.

In this reaction, when the compound [III] is used in a free acid form or its salt form, the reaction is preferably carried out in the presence of a conventional condensing agent such as N,N'-dicyclohexylcarbodiimide; N-cyclohexyl-N'-morpholinoethylcarbodiimide; N-cyclohexyl-N'-(4-diethylaminocyclohexyl)carbodiimide; N,N'-diethylcarbodiimide, N,N'-diisopropylcarbodiimide; N-ethyl-N'-(3-dimethylaminopropyl)carbodiimide, N,N-carbonylbis-(2-methylimidazole); pentamethyleneketene-N-cyclohexylimine; diphenylketene-N-cyclohexylimine; ethoxyacetylene; 1-alkoxy-2-chloroethylene; trialkyl phosphite; ethyl polyphosphate; isopropyl polyphosphate; phosphorus oxychloride (phosphoryl chloride); phosphorus trichloride; thionyl chloride; oxalyl chloride; lower alkyl haloformate [e.g., ethyl chloroformate, isopropyl chloroformate, etc.]; triphenylphosphine; 2-ethyl-7-hydroxybenzisoxazolium salt; 2-ethyl-5-(m-sulfophenyl)isoxazolium hydroxide intramolecular salt; 1-(p-chlorobenzenesulfonyloxy)-6-chloro-1H-benzotriazole; so-called Vilsmeier reagent prepared by the reaction of N,N-dimethylformamide with thionyl chloride, phosgene, trichloromethyl chloroformate, phosphorous oxychloride, methanesulfonyl chloride, etc.; or the like.

The reaction may also be carried out in the presence of an inorganic or organic base such as an alkali metal carbonate, alkali metal bicarbonate, tri(lower)alkylamine, pyridine, di(lower)alkylaminopyridine (e.g.,

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4-dimethylaminopyridine, etc.), N-(lower)alkylmorpholine, N,N-di(lower)alkylbenzylamine, or the like.

The reaction temperature is not critical, and the reaction is usually carried out under cooling to warming.

5

The starting compound [II] is a known compound. It can be prepared by fermentation and synthetic processes disclosed in EP 0462531 A2.

10 A culture of *Coleophoma* sp. F-11899, which is used in said fermentation process, has been deposited with National Institute of Bioscience and Human-Technology Agency of Industrial Science and Technology (former name: Fermentation Research Institute Agency of Industrial Science and Technology) (1-3, Higashi 1-chome, Tsukuba-

15 shi, IBARAKI 305, JAPAN) on October 26, 1989 under the number of FERM BP-2635.

The compounds obtained by the above Process 1 can be isolated and purified by a conventional method such as

20 pulverization, recrystallization, column-chromatography, high-performance liquid chromatography (HPLC), reprecipitation, or the like.

The compounds obtained by the above Process 1 may be

25 obtained as its hydrate, and its hydrate is included within the scope of this invention.

It is to be noted that each of the object compound (I) may include one or more stereoisomer such as optical

30 isomer(s) and geometrical isomer(s) due to asymmetric carbon atom(s) and double bond(s) and all such isomers and mixture thereof are included within the scope of this invention.

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Biological property of the polypeptide
compound [I] of the present invention

In order to show the usefulness of the polypeptide
5 compound [I] of the present invention, the biological data
of the representative compound is explained in the
following.

Test 1 (Antimicrobial activity) :

10 In vitro antimicrobial activity of the compound of
Example 17 disclosed later was determined by the two-fold
agar-plate dilution method as described below.

Test Method

15 One loopful of an overnight culture of each test
microorganism in Sabouraud broth containing 2% Glucose
(10^5 viable cells per ml) was streaked on yeast nitrogen
base dextrose agar (YNBDA) containing graded
concentrations of the object polypeptide compound [I], and
20 the minimal inhibitory concentration (MIC) was expressed
in terms of $\mu\text{g/ml}$ after incubation at 30°C for 24 hours.

Test Result

MIC ($\mu\text{g/ml}$)

25	Test compound Test organism	The compound of <u>Example 17</u>
	candida albicans FP-633	0.2

30

From the test result, it is realized that the object
polypeptide compound [I] of the present invention has an
antimicrobial activity (especially, antifungal activity).

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The pharmaceutical composition of the present

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invention can be used in the form of a pharmaceutical preparation, for example, in solid, semisolid or liquid form, which contains the object polypeptide compound (I) or a pharmaceutically acceptable salt thereof, as an
5 active ingredient in admixture with an organic or inorganic carrier or excipient which is suitable for rectal; pulmonary (nasal or buccal inhalation); ocular; external (topical); oral administration; parenteral (including subcutaneous, intravenous and intramuscular)
10 administrations; insufflation (including aerosols from metered dose inhalator); nebulizer; or dry powder inhalator.

The active ingredient may be compounded, for example,
15 with the usual non-toxic, pharmaceutically acceptable carriers in a solid form such as granules, tablets, dragees, pellets, troches, capsules, or suppositories; creams, ointments; aerosols; powders for insufflation; in a liquid form such as solutions, emulsions, or
20 suspensions for injection; ingestion; eye drops; and any other form suitable for use. And, if necessary, there may be included in the above preparation auxiliary substance such as stabilizing, thickening, wetting, emulsifying and coloring agents; perfumes or buffer; or any other commonly
25 may be used as additives.

The object polypeptide compound [I] or a pharmaceutically acceptable salt thereof is/are included in the pharmaceutical composition in an amount sufficient to produce the desired antimicrobial effect upon the
30 process or condition of diseases.

For applying the composition to human, it is preferable to apply it by intravenous, intramuscular, pulmonary, oral administration, or insufflation. While the dosage of therapeutically effective amount of the
35 object polypeptide compound [I] varies from and also

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depends upon the age and condition of each individual patient to be treated, in the case of intravenous administration, a daily dose of 0.01-20 mg of the object polypeptide compound [I] per kg weight of human being in the case of intramuscular administration, a daily dose of 0.1-20 mg of the object polypeptide compound [I] per kg weight of human being, in case of oral administration, a daily dose of 0.5-50 mg of the object polypeptide compound [I] per kg weight of human being is generally given for treating or preventing infectious diseases.

Especially in case of the treatment of prevention of Pneumocystis carinii infection, the followings are to be noted.

For administration by inhalation, the compounds of the present invention are conveniently delivered in the form of an aerosol spray presentation from pressurized as powders which may be formulated and the powder compositions may be inhaled with the aid of an insufflation powder inhaler device. The preferred delivery system for inhalation is a metered dose inhalation aerosol, which may be formulated as a suspension or solution of compound in suitable propellants such as fluorocarbons or hydrocarbons.

Because of desirability to directly treat lung and bronchi, aerosol administration is a preferred method of administration. Insufflation is also a desirable method, especially where infection may have spread to ears and other body cavities.

Alternatively, parenteral administration may be employed using drip intravenous administration.

The following Preparations and Examples are given for the purpose of illustrating the present invention in more detail.

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Preparation 1

To a suspension of 1-(4-Hydroxyphenyl)-4-tert-butoxycarbonylpiperazine (3 g) and potassium carbonate (0.82 g) in N,N-dimethylformamide (15 ml) was added octyl bromide (1.87 ml). The mixture was stirred for 10 hours at 70°C. The reaction mixture was added to a mixture of water and ethyl acetate. The organic layer was taken, and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure. The residue was subjected to column chromatography on silica gel, and eluted with (hexane : ethyl acetate = 9:1). The fractions containing the object compound were combined, and evaporated under reduced pressure to give 1-(4-n-Octyloxyphenyl)-4-tert-butoxycarbonylpiperazine (2.71 g).

IR (KBr) : 1687, 1513, 1241 cm^{-1}

NMR (CDCl_3 , δ) : 0.88 (3H, t, $J=6.2\text{Hz}$), 1.2-1.4 (10H, m), 1.48 (9H, s), 1.65-1.85 (2H, m), 3.00 (4H, t, $J=5.2\text{Hz}$), 3.57 (4H, t, $J=5.2\text{Hz}$), 3.90 (2H, t, $J=6.5\text{Hz}$), 6.83 (2H, dd, $J=6.4$ and 2.1Hz), 6.89 (2H, dd, $J=6.4$ and 2.1Hz)

Preparation 2

A solution of 1-(4-n-Octyloxyphenyl)-4-tert-butoxycarbonylpiperazine (2.61 g) in trifluoroacetic acid (20 ml) was stirred for 4 hours at ambient temperature. The reaction mixture was evaporated under reduced pressure, and to the residue was added a mixture of 1N NaOH aqueous solution and ethyl acetate. The organic layer was taken, and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure to give 1-(4-n-Octyloxyphenyl)piperazine (0.86 g).

IR (KBr) : 2923, 1513, 1259, 831 cm^{-1}

NMR (CDCl_3 , δ) : 0.88 (3H, t, $J=6.4\text{Hz}$), 1.2-1.53

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(10H, m), 1.65-1.85 (2H, m), 3.03 (4H, s), 3.90
(2H, t, J=6.5Hz), 6.83 (2H, dd, J=6.4 and
2.9Hz), 6.90 (2H, dd, J=6.4 and 2.9Hz)

APCI-MASS : m/z = 291 ($M^+ + 1$)

5

Preparation 3

To a suspension of 1-(4-n-Octyloxyphenyl)piperazine
(1 g) and potassium carbonate (0.476 g) in N,N-dimethyl-
formamide (1 ml) was added p-fluorobenzonitrile (0.347 g),
10 and stirred for 5 hours at 160°C. The reaction mixture
was added to a mixture of water and ethyl acetate. The
organic layer was taken, and dried over magnesium sulfate.
The magnesium sulfate was filtered off, and the filtrate
was evaporated under reduced pressure to give 4-[4-(4-n-
15 Octyloxyphenyl)piperazin-1-yl]benzonitrile (0.93 g).

IR (KBr) : 2848, 2217, 1604, 1511, 1241 cm^{-1}

NMR (CDCl_3 , δ) : 0.89 (3H, t, J=6.8Hz), 1.2-1.53

(10H, m), 1.65-1.85 (2H, m), 3.20 (4H, t,

J=5.4Hz), 3.48 (4H, t, J=5.4Hz), 3.91 (2H, t,

20 J=6.5Hz), 6.8-7.0 (6H, m), 7.52 (2H, d, J=8.9Hz)

APCI-MASS : m/z = 392 ($M^+ + 1$)

Preparation 4

A mixture of 2,4-Dihydroxybenzaldehyde (5.52 g),
25 potassium carbonate (6.08 g) and octyl bromide (7.73 g) in
acetonitrile (55 ml) was stirred for 16 hours at 60°C.
The solvent of reaction mixture was removed under reduced
pressure, and the residue was dissolved in ethyl acetate,
and washed with water and brine. The separated organic
30 layer was dried over magnesium sulfate. The magnesium
sulfate was filtered off, and the filtrate was evaporated
under reduced pressure. The residue was subjected to
column chromatography on silica gel and eluted with
(hexane : ethyl acetate = 9:1) to give 2-Hydroxy-4-
35 octyloxybenzaldehyde (6.73 g).

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NMR (CDCl_3 , δ) : 0.89 (3H, t, $J=8.8\text{Hz}$), 1.2-1.5
(10H, m), 1.8-2.0 (2H, m), 4.0-4.2 (2H, m), 6.42
(1H, s), 6.52 (1H, d, $J=8.7\text{Hz}$), 7.79 (1H, d,
 $J=8.7\text{Hz}$), 10.33 (1H, s)

5 APCI-MASS : $m/z = 257 (M^++1)$

The following compound was obtained according to a
similar manner to that of Preparation 4.

10 Preparation 5

Methyl 3,4-dipentyloxybenzoate

NMR (CDCl_3 , δ) : 0.93 (6H, t, $J=6.0$ and 9.0Hz), 1.3-
2.0 (12H, m), 3.88 (3H, s), 4.04 (4H, m),
6.86 (1H, d, $J=8.4\text{Hz}$), 7.53 (1H, d, $J=2.0\text{Hz}$),
15 7.63 (1H, dd, $J=8.4$ and 2.0Hz)

APCI-MASS : $m/z = 309 (M^++1)$

Preparation 6

A mixture of 4-bromo-4'-pentylbiphenyl (5.04 g),
20 trimethylsilylacetylene (2.4 ml),
tetrakis(triphenylphosphine)palladium (0.96 g),
triphenylphosphine (0.22 g) and cuprous iodide (95 mg) in
piperidine (10 ml) was heated for an hour under
atmospheric pressure of nitrogen at 90°C . The reaction
25 mixture was poured into a mixture of cold water and ethyl
acetate, and adjusted to about pH 1 with 6N hydrochloric
acid. The separated organic layer was washed with water
and brine, and dried over magnesium sulfate. The
magnesium sulfate was filtered off, and the filtrate was
30 evaporated under reduced pressure to give crude 2-[4-(4-
pentylphenyl)phenyl]-1-trimethylsilylacetylene, which was
used for the next reaction without further purification.
Crude mixture was dissolved in a mixture of
dichloromethane (10 ml) and methanol (10 ml), and to the
35 solution was added potassium carbonate (2.75 g) at 0°C .

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The mixture was allowed to warm to ambient temperature, and stirred for another 2 hours. The reaction mixture was poured into a mixture of cold water and ethyl acetate, and the resultant precipitate was filtered off. The filtrate was adjusted to about pH 7 with 1N hydrochloric acid, and washed with brine, and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure to give a crude powder, which was subjected to column chromatography on silica gel (300 ml), and eluted with a mixture of (n-hexane : ethyl acetate = 99:1 - 97:3, V/V) to give 4-(4-Pentylphenyl)phenylacetylene (2.09g).

IR (Nujol) : 3274, 1490 cm^{-1}

NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.4\text{Hz}$), 1.30-1.50 (4H, m), 1.50-1.80 (2H, m), 2.64 (2H, t, $J=7.6\text{Hz}$), 7.20-7.30 (2H, m), 7.45-7.60 (6H, m)

APCI-MASS : $m/z = 281$ ($M^+ + 1$ + MeOH)

The following compound was obtained according to a similar manner to that of Preparation 6.

Preparation 7

6-Heptyloxynaphthalen-2-yl-acetylene

NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.5\text{Hz}$), 1.20-1.60 (8H, m), 1.70-1.90 (2H, m), 3.10 (1H, s), 4.07 (2H, t, $J=6.5\text{Hz}$), 7.08 (1H, d, $J=2.5\text{Hz}$), 7.15 (1H, dd, $J=2.5$ and 8.9Hz), 7.47 (1H, dd, $J=1.6$ and 8.5Hz), 7.64 (1H, d, $J=7.3\text{Hz}$), 7.68 (1H, d, $J=8.5\text{Hz}$), 7.94 (1H, d, $J=1.6\text{Hz}$)

APCI-MASS : $m/z = 267$ ($M^+ + 1$)

Preparation 8

To a solution of 4-(4-Pentylphenyl)phenylacetylene (2.09 g) in tetrahydrofuran (30 ml) was added dropwise a solution of lithium diisobutylamide in a mixture of

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tetrahydrofuran and n-hexane (1.60 M, 5.6 ml) at -75°C, and the resultant mixture was stirred for an hour at -78°C. To the mixture was added methyl chloroformate (0.72 ml), and the reaction mixture was allowed to warm to ambient temperature. The solution was diluted with ethyl acetate, and washed in turn with water and brine, and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure to give a crude product, which was subjected to column chromatography on silica gel (150 ml), and eluted with a mixture of (n-hexane : ethyl acetate = 100:0 - 9:1, V/V) to give Methyl 3-[4-(4-pentylphenyl)phenyl]propionate (2.20 g).

IR (Nujol) : 2225, 1712 cm^{-1}

NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.5\text{Hz}$), 1.25-1.50 (4H, m), 1.52-1.80 (2H, m), 2.64 (2H, t, $J=7.6\text{Hz}$), 3.85 (3H, s), 7.20-7.35 (2H, m), 7.40-7.70 (6H, m)

APCI-MASS : $m/z = 307$ (M^++1)

The following compound was obtained according to a similar manner to that of Preparation 8.

Preparation 9

Methyl 3-(6-heptyloxynaphthalen-2-yl)propionate

IR (Nujol) : 2219, 1704, 1621 cm^{-1}

NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.5\text{Hz}$), 1.20-1.60 (8H, m), 1.70-2.00 (2H, m), 3.86 (3H, s), 4.08 (2H, t, $J=6.5\text{Hz}$), 7.10 (1H, d, $J=2.5\text{Hz}$), 7.17 (1H, dd, $J=2.5$ and 8.9Hz), 7.52 (1H, dd, $J=1.6$ and 8.5Hz), 7.68 (1H, d, $J=7.3\text{Hz}$), 7.72 (1H, d, $J=8.5\text{Hz}$), 8.06 (1H, d, $J=1.6\text{Hz}$)

APCI-MASS : $m/z = 325$ (M^++1)

Preparation 10

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A mixture of 4-bromo-4'-pentylbiphenyl (5.0 g), methyl acrylate (2.2 ml), palladium acetate (0.11 g) and tris(o-tolyl)phosphine (0.60 g) in triethylamine (16 ml) was refluxed for 15 hours under nitrogen atmosphere. The reaction mixture was poured into a mixture of cold water and ethyl acetate, and adjusted to about pH 1.5 with 6N hydrochloric acid. The separated organic layer was washed in turn with water and brine, and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure to give a crude powder, which was subjected to column chromatography on silica gel (200 ml), and eluted with a mixture of (n-hexane : ethyl acetate = 100:0 - 94:6, V/V) to give Methyl 3-[4-(4-pentylphenyl)phenyl]acrylate (4.48 g).

IR (Nujol) : 1718, 1637 cm^{-1}
NMR (CDCl_3 , δ) : 0.91 (3H, t, $J=6.7\text{Hz}$), 1.20-1.50 (4H, m), 1.50-1.80 (2H, m), 2.65 (2H, t, $J=7.4\text{Hz}$), 3.82 (3H, s), 6.47 (1H, d, $J=16.0\text{Hz}$), 7.20-7.35 (2H, m), 7.45-7.68 (6H, m), 7.73 (1H, d, $J=16.0\text{Hz}$)
APCI-MASS : m/z = 309 (M^++1)

The following compounds (Preparations 11 to 13) were obtained according to a similar manner to that of Preparation 10.

Preparation 11

Methyl 3-(6-heptyloxynaphthalen-2-yl)acrylate
IR (Nujol) : 1716, 1625, 1459 cm^{-1}
NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.5\text{Hz}$), 1.20-1.65 (8H, m), 1.76-1.93 (2H, m), 3.82 (3H, s), 4.07 (2H, t, $J=6.5\text{Hz}$), 6.49 (1H, d, $J=16.0\text{Hz}$), 7.05-7.20 (2H, m), 7.55-7.90 (5H, m)
APCI-MS : m/z = 327 (M^++1)

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Preparation 12

Methyl 3-[4-(4-heptylphenyl)phenyl]acrylate

NMR (CDCl₃, δ) : 0.88 (3H, t, J=6.5Hz), 1.15-1.50
(8H, m), 1.50-1.75 (2H, m), 2.64 (2H, t,
J=7.6Hz), 3.81 (3H, s), 6.46 (1H, d, J=16.0Hz),
7.26 (2H, d, J=8.2Hz), 7.52 (2H, d, J=8.2Hz),
7.59 (6H, s), 7.73 (1H, d, J=16.0Hz)

APCI-MASS : m/z = 337 (M⁺+1)10 Preparation 13

Methyl 3-[4-(4-pentyloxyphenyl)phenyl]acrylate

NMR (CDCl₃, δ) : 0.94 (3H, t, J=7.0Hz), 1.30-1.60
(4H, m), 1.70-1.93 (2H, m), 3.82 (3H, s), 4.00
(2H, t, J=6.7Hz), 6.45 (1H, d, J=16.0Hz), 6.90-
7.05 (2H, m), 7.48-8.65 (6H, m), 7.72 (1H, d,
J=16.0Hz)

APCI-MASS : m/z = 325 (M⁺+1)Preparation 14

20 A mixture of 6-Heptyloxynaphthalen-2-carboxylic acid
(1.00 g) and thionyl chloride (5 ml) was stirred for 18
hours at ambient temperature, and concentrated under
reduced pressure to give crude 6-heptyloxy-2-naphthoyl
chloride. To a mixture of ethyl isonipecotinate (605 mg),
25 triethylamine (425 mg) and N,N-dimethylaminopyridine (10
mg) in dichloromethane (10 ml) was added crude 6-
heptyloxy-2-naphthoyl chloride, and the mixture was
stirred for 2 hours at ambient temperature, and diluted
with dichloromethane. The mixture was washed with water,
30 1N hydrochloric acid and brine, and dried over magnesium
sulfate. The magnesium sulfate was filtered off, and
filtrate was evaporated under reduced pressure. The
residue was subjected to column chromatography on silica
gel, and eluted with (n-hexane : ethyl acetate = 3:1) to
35 give 4-Ethoxycarbonyl-1-(6-heptyloxy-2-

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napththoyl)piperidine (1.20 g).

NMR (CDCl₃, δ) : 0.90 (3H, t, J=6.6Hz), 1.2-2.0
(19H, m), 2.5-2.7 (1H, m), 3.0-3.2 (2H, m), 4.1-
4.3 (4H, m), 7.1-7.2 (2H, m), 7.44 (1H, dd,
J=8.4 and 1.7Hz), 7.72 (1H, d, J=3.9Hz), 7.77
(1H, d, J=3.9Hz), 7.82 (1H, s)

APCI-MASS : m/z = 426 (M⁺+1)

Preparation 15

To a mixture of Methyl 3,4-diaminobenzoate (1.91 g)
and triethylamine (0.56 g) in N,N-dimethylformamide (20
ml) was added decanoyl chloride (2.31 g), and the mixture
was stirred for an hour at 0°C. The reaction mixture was
diluted with ethyl acetate, and washed with water and
brine. The separated organic layer was dried over
magnesium sulfate. The magnesium sulfate was filtered
off, and filtrate was evaporated under reduced pressure.
The residue was dissolved in methanol (20 ml), and conc.
sulfuric acid (0.05 ml) was added, and the mixture was
stirred for 6 hours at 60°C. After cooling, the reaction
mixture was evaporated under reduced pressure. The
residue was diluted with ethyl acetate, and washed with
water and brine. The separated organic layer was dried
over magnesium sulfate. The magnesium sulfate was
filtered off, and filtrate was evaporated under reduced
pressure. Purification of the residue by column
chromatography on silica gel eluted with (n-hexane : ethyl
acetate = 3:1) gave
5-Methoxycarbonyl-2-nonylbenzimidazole (1.40 g).

IR (KBr pelet) : 2923, 1718, 1623, 1544, 1438, 1413,
1288, 1213, 1085, 750 cm⁻¹

NMR (DMSO-d₆, δ) : 0.84 (3H, t, J=6.7Hz), 1.1-1.4
(12H, m), 1.7-1.9 (2H, m), 2.83 (2H, t,
J=7.4Hz), 7.56 (1H, d, J=8.4Hz), 7.78 (1H, d,
J=8.4Hz), 8.07 (1H, s)

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APCI-MASS : $m/z = 303 (M^+ + 1)$ Preparation 16

To a mixture of dimethylmalonate (4 ml), 2-hydroxy-4-octyloxybenzaldehyde (2.50 g) and piperidine (0.1 ml) in methanol (10 ml) was added acetic acid (0.01 ml), and the mixture was stirred for 3 hours at 70°C. The solvents were removed under reduced pressure, and the residue was dissolved in ethyl acetate, and washed with 0.5N hydrochloric acid, water and brine, and dried over magnesium sulfate. The magnesium sulfate was filtered off, and filtrate was evaporated under reduced pressure, and the precipitate was collected by filtration, and washed with n-hexane, and dried to give Methyl 7-octyloxycoumarin-3-carboxylate (0.94 g).

NMR (DMSO- d_6 , δ) : 0.86 (3H, m), 1.2-1.6 (10H, m), 1.7-1.8 (2H, m), 3.81 (3H, s), 4.11 (2H, t, $J=6.4\text{Hz}$), 6.9-7.1 (2H, m), 7.83 (1H, d, $J=9.0\text{Hz}$), 8.75 (1H, s)

APCI-MASS : $m/z = 333 (M^+ + 1)$

Preparation 17

To a mixture of sodium hydride (423 mg) and 4-octylphenol (2.06 g) in tetrahydrofuran (16 ml) was added dropwise ethyl 2-chloroacetoacetate at ambient temperature. The mixture was stirred for 6 hours at 70°C under nitrogen atmosphere, and poured into saturated ammonium chloride aqueous solution. The solution was extracted with ethyl acetate, and the organic layer was washed with water and brine, and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure. The residue was added to conc. H_2SO_4 (10 ml) at 0°C, and mixture was stirred for 10 minutes. The reaction mixture was poured into ice-water, and adjusted to pH 7.0 with 1N

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NaOH aqueous solution, and extracted with ethyl acetate. The organic layer was washed with water and brine, and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure. The residue was subjected to column-chromatography on silica gel, and eluted with (hexane : ethyl acetate = 95:5). The fractions containing the object compound were combined, and evaporated under reduced pressure to give Ethyl 3-methyl 5-octylbenzo[b]furan-2-carboxylate (1.44 g).

IR (Neat) : 2925, 2854, 1712, 1596, 1463, 1292, 1149, 1089 cm^{-1}

NMR (CDCl_3 , δ) : 0.88 (3H, t, $J=6.7\text{Hz}$), 1.2-1.5 (10H, m), 1.44 (3H, t, $J=7.1\text{Hz}$), 1.6-1.8 (2H, m), 2.58 (3H, s), 2.71 (2H, t, $J=8.0\text{Hz}$), 4.45 (2H, t, $J=7.1\text{Hz}$), 7.2-7.5 (3H, m)

APCI-MASS : $m/z = 317$ ($M^+ + 1$)

Preparation 18

To a solution of Ethyl 3-amino-4-hydroxybenzoate (1.81 g) and triethylamine (1.53 ml) in dichloromethane (20 ml) was dropwise added decanoyl chloride (2.01 ml) at 0°C . The reaction mixture was stirred for 48 hours at ambient temperature, and washed with water, 0.5N hydrochloric acid, water and brine. The separated organic layer was dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure. To the residue dissolved in xylene (30 ml) was added p-toluene sulfonic acid monohydrate (0.5 g), and the mixture was stirred for 4 hours at 130°C . Ethyl acetate was added to the mixture, and washed with water and brine. The separated organic layer was dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure. Purification of the residue by

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column chromatography on silica gel elluted with
(n-hexane : ethyl acetate = 9:1, V/V) gave Ethyl 2-nonyl
benzo[b]oxazole-6-carboxylate (2.36 g).

5 IR (KBr pelet) : 2914, 1722, 1621, 1575, 1470,
1429, 1365, 1290, 1203, 1151, 1115, 1081,
1022 cm^{-1}

NMR (CDCl_3 , δ) : 0.88 (3H, t, $J=6.7\text{Hz}$), 1.2-1.4 (12H,
m), 1.42 (3H, t, $J=7.2\text{Hz}$), 1.90 (2H, m), 2.95
10 (2H, t, $J=7.4\text{Hz}$), 4.40 (2H, q, $J=7.0\text{Hz}$), 7.50
(1H, d, $J=8.5\text{Hz}$), 8.06 (1H, d, $J=8.5\text{Hz}$), 8.37
(1H, s)

APCI-MASS : $m/z = 318$ (M^++1)

Preparation 19

15 A mixture of Methyl 3,4-diaminobenzoate (1.84 g) and
4-hexyloxy benzaldehyde (2.30 g) in nitrobenzene (40 ml)
was stirred for 48 hours at 145°C . After cooling, the
mixture was evaporated under reduced pressure.

20 Purification of the residue by column chromatography on
silica gel eluted with (n-hexane : ethyl acetate = 2:1)
gave 5-Methoxycarbonyl-2-(4-hexyloxyphenyl)benzimidazole
(1.19 g).

25 NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.4\text{Hz}$), 1.2-1.9 (8H,
m), 3.92 (3H, s), 3.90-4.1 (2H, m), 6.93 (2H, d,
 $J=8.9\text{Hz}$), 7.5-7.8 (1H, br), 7.94 (1H, dd, $J=8.5$
and 1.5Hz); 8.03 (1H, d, $J=8.9\text{Hz}$), 8.2-8.4 (1H,
br)

APCI-MASS : $m/z = 353$ (M^++1)

30 Preparation 20

A mixture of Methyl 3-[4-(4-pentylphenyl)phenyl]-
acrylate (2.0 g) and 10% palladium on carbon (50% wet, 0.2
g) in tetrahydrofuran (20 ml) was stirred for 8 hours
under atmospheric pressure of hydrogen at ambient
35 temparature. The catalyst was filtered off, and the

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filtrate was evaporated under reduced pressure to give Methyl 3-[4-(4-pentylphenyl)phenyl]propionate (1.93 g).

5 NMR (CDCl₃, δ) : 0.90 (3H, t, J=6.8Hz), 1.25-1.50 (4H, m), 1.50-1.75 (2H, m), 2.55-2.75 (4H, m), 2.99 (2H, t, J=8.0Hz), 3.68 (3H, s), 7.10-7.30 (4H, m), 7.40-7.60 (4H, m)

APCI-MASS : m/z = 311 (M⁺+1)

Preparation 21

10 A mixture of Methyl 3-[4-(4-pentyloxyphenyl)phenyl]-acrylate (2.70 g) and platinum oxide (0.41 g) in tetrahydrofuran (40 ml) was stirred for 8 hours under 3 atm of hydrogen at ambient temperature. The catalyst was filtered off, and the filtrate was evaporated under
15 reduced pressure to give Methyl 3-[4-(4-pentyloxyphenyl)phenyl]propionate (2.70 g).

20 NMR (CDCl₃, δ) : 0.94 (3H, t, J=7.0Hz), 1.28-1.60 (4H, m), 1.60-1.95 (2H, m), 2.55-2.78 (2H, m), 2.98 (2H, t, J=7.8Hz), 3.98 (2H, t, J=6.5Hz), 6.85-7.05 (2H, m), 7.05-7.30 (2H, m), 7.40-7.55 (4H, m)

APCI-MASS : m/z = 327 (M⁺+1)

25 The following compound was obtained according to a similar manner to that of Preparation 21.

Preparation 22

Methyl 3-(6-heptyloxynaphthalen-2-yl)propionate

30 NMR (CDCl₃, δ) : 0.90 (3H, t, J=6.5Hz), 1.20-1.70 (8H, m), 1.70-1.93 (2H, m), 2.70 (2H, t, J=7.7Hz), 3.07 (2H, t, J=7.7Hz), 3.67 (3H, s), 4.05 (2H, t, J=6.5Hz), 7.02-7.20 (2H, m), 7.20-7.38 (2H, m), 7.55 (1H, s), 7.66 (1H, dd, J=3.0 and 8.5Hz)

35 APCI-MASS : m/z = 329 (M⁺+1)

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Preparation 23

To a mixture of Methyl 3-[4-(4-pentylphenyl)phenyl]-acrylate (0.41 g) in tetrahydrofuran (5 ml) was added 3N NaOH aqueous solution (1.3 ml), and the resultant mixture
5 was heated to 85°C for 10 hours. The reaction mixture was poured into a mixture of cold water and ethyl acetate, and adjusted to about pH 2 with 6N hydrochloric acid. The separated organic layer was washed in turn with water and brine, and dried over magnesium sulfate. The magnesium
10 sulfate was filtered off, and the filtrate was evaporated under reduced pressure to give 3-[4-(4-Pentylphenyl)phenyl]acrylic acid (0.41 g).

NMR (DMSO-d₆, δ) : 0.87 (3H, t, J=7.5Hz), 1.15-1.46 (4H, m), 1.48-1.70 (2H, m), 2.61 (2H, t, J=7.4Hz),
15 6.56 (1H, d, J=16.0Hz), 7.29 (2H, d, J=8.2Hz), 7.60 (2H, d, J=4.0Hz), 7.66 (2H, d, J=4.0Hz), 7.68-7.85 (3H, m)

APCI-MASS : m/z = 295 (M⁺+1)

20 The following compounds (Preparations 24 to 31) were obtained according to a similar manner to that of Preparation 23.

Preparation 24

25 3-[4-(4-Pentyloxyphenyl)phenyl]propionic acid
IR (Nujol) : 1697, 1606, 1500 cm⁻¹
NMR (CDCl₃, δ) : 0.94 (3H, t, J=7.1Hz), 1.25-1.60 (4H, m), 1.70-1.95 (2H, m), 2.72 (2H, t, J=7.5Hz),
3.00 (2H, t, J=7.5Hz), 3.99 (2H, t, J=6.5Hz),
30 6.95 (2H, dd, J=2.1 and 6.7Hz), 7.25 (2H, d, J=8.2Hz), 7.40-7.60 (4H, m)
APCI-MASS : m/z = 313 (M⁺+1)

Preparation 25

35 3-[4-(4-Heptylphenyl)phenyl]propionic acid

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5 NMR (CDCl₃, δ) : 0.88 (3H, t, J=6.8Hz), 1.15-1.50
(8H, m), 1.50-1.78 (2H, m), 2.65 (2H, t,
J=7.6Hz), 6.48 (1H, d, J=16.0Hz), 7.27 (2H, d,
J=8.2Hz), 7.53 (2H, d, J=8.2Hz), 7.63 (4H, m),
7.83 (1H, d, J=16.0Hz)

APCI-MASS : m/z = 323 (M⁺+1)

Preparation 26

3-[4-(4-Pentylphenyl)phenyl]propionic acid

10 NMR (CDCl₃, δ) : 0.90 (3H, t, J=6.4Hz), 1.20-1.50
(4H, m), 1.50-1.75 (2H, m), 2.64 (2H, t,
J=8.0Hz), 2.67 (2H, t, J=9.6Hz), 3.00 (2H, t,
J=8.0Hz), 7.15-7.38 (4H, m), 7.38-7.60 (4H, m)

APCI-MASS : m/z = 297 (M⁺+1)

15

Preparation 27

3-(6-Heptyloxynaphthalen-2-yl)propionic acid

20 NMR (CDCl₃, δ) : 0.90 (3H, t, J=6.5Hz), 1.20-1.65
(8H, m), 1.75-2.00 (2H, m), 2.75 (2H, t,
J=7.7Hz), 3.09 (2H, t, J=7.7Hz), 4.06 (2H, t,
J=6.5Hz), 7.05-7.15 (2H, m), 7.15-7.35 (2H, m),
7.50-7.73 (2H, m)

APCI-MASS : m/z = 315 (M⁺+1)

25 Preparation 28

3-(6-Heptyloxynaphthalen-2-yl)acrylic acid

30 NMR (CDCl₃, δ) : 0.90 (3H, t, J=6.5Hz), 1.15-1.60
(8H, m), 1.75-1.95 (2H, m), 4.09 (2H, t,
J=6.5Hz), 6.51 (1H, d, J=16.0Hz), 7.09-7.30 (2H,
m), 7.65-8.00 (5H, m)

Preparation 29

3-[4-(4-Pentylphenyl)phenyl]propionic acid

35 NMR (CDCl₃, δ) : 0.91 (3H, t, J=6.5Hz), 1.23-1.50
(4H, m), 1.50-1.80 (2H, m), 2.65 (2H, t,

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$J=7.6\text{Hz}$), 7.27 (2H, d, $J=8.2\text{Hz}$), 7.51 (2H, d, $J=8.2\text{Hz}$), 7.58-7.80 (4H, m)

APCI-MASS : $m/z = 325$ ($M^++1 + \text{MeOH}$)

5 Preparation 30

3-(6-Heptyloxynaphthalen-2-yl)propionic acid

IR (Nujol) : 2645, 2198, 1670, 1627 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.85 (3H, t, $J=6.5\text{Hz}$), 1.10-1.60 (8H, m), 1.65-1.90 (2H, m), 4.10 (2H, t,

10 $J=6.5\text{Hz}$), 7.24 (1H, dd, $J=2.4$ and 8.9Hz), 7.39 (1H, d, $J=2.5\text{Hz}$), 7.55 (1H, dd, $J=1.6$ and 8.5Hz), 7.8-8.0 (2H, m), 8.22 (1H, d, $J=1.6\text{Hz}$)

APCI-MASS : $m/z = 343$ ($M^++1 + \text{MeOH}$)

15 Preparation 31

4-[5-(4-Pentyloxyphenyl)isoxazolyl-3-yl]benzoic acid

IR (KBr) : 2939, 2867, 1681, 1614, 1429, 1255, 1178, 821 cm^{-1}

20 NMR (DMSO- d_6 , δ) : 0.91 (3H, t, $J=7.1\text{Hz}$), 1.3-1.5 (4H, m), 1.6-1.8 (2H, m), 4.04 (2H, t, $J=6.5\text{Hz}$), 7.11 (2H, d, $J=8.9\text{Hz}$), 7.54 (1H, s), 7.85 (2H, d, $J=8.9\text{Hz}$), 7.98 (2H, d, $J=8.6\text{Hz}$), 8.11 (2H, d, $J=8.6\text{Hz}$)

APCI-MASS : $m/z = 352$ ($M+H$) $^+$

25

Preparation 32

To a solution of Ethyl 3-methyl-5-octylbenzo[b]furan-2-carboxylate (1.44 g) in ethanol (20 ml) was added 10% NaOH aqueous solution (2.2 ml), and stirred for 2 hours at ambient temperature, and evaporated under reduced pressure. The residue was adjusted to pH 3.0 with 1N hydrochloric acid, and extracted with ethyl acetate. The organic layer was washed with brine, and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure to

30

35

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give 3-Methyl-5-octylbenzo[b]furan-2-carboxylic acid (1.00 g).

IR (KBr pelet) : 2923, 1689, 1664, 1581, 1456, 1319, 1159, 933 cm^{-1}

5 NMR (DMSO- d_6 , δ) : 0.85 (3H, t, $J=6.7\text{Hz}$),
1.2-1.5 (10H, m), 1.5-1.8 (2H, m), 2.49 (3H, s),
2.69 (2H, t, $J=7.9\text{Hz}$), 7.32 (1H, dd, $J=8.5$ and
1.7Hz), 7.52 (1H, d, $J=8.5\text{Hz}$), 7.54 (1H, d,
 $J=1.7\text{Hz}$), 13.2-13.5 (1H, br)

10 APCI-MASS : $m/z = 289$ (M^++1)

The following compounds (Preparations 33 to 39) were obtained according to a similar manner to that of Preparation 32.

15

Preparation 33

3,4-Dipentyloxybenzoic acid

20 NMR (DMSO- d_6 , δ) : 0.89 (6H, t, $J=6.8\text{Hz}$),
1.2-1.5 (8H, m), 1.6-1.8 (4H, m), 3.9-4.1 (4H,
m), 7.02 (1H, d, $J=8.4\text{Hz}$), 7.43 (1H, d,
 $J=1.7\text{Hz}$), 7.53 (1H, dd, $J=8.4$ and 1.7Hz)

APCI-MASS : $m/z = 295$ (M^++1)

Preparation 34

25 1-(6-Heptyloxy-2-naphthoyl)piperidine-4-carboxylic acid

30 NMR (DMSO- d_6 , δ) : 0.88 (3H, t, $J=6.7\text{Hz}$), 1.2-2.0
(14H, m), 2.5-2.6 (1H, m), 2.9-3.2 (2H, br),
3.25 (2H, s), 4.09 (2H, t, $J=6.5\text{Hz}$), 7.20 (1H,
dd, $J=8.9$ and 2.4Hz), 7.36 (1H, d, $J=2.3\text{Hz}$),
7.43 (1H, dd, $J=8.4$ and 1.5Hz), 7.8-8.0 (3H, m),
12.30 (1H, br)

APCI-MASS : $m/z = 398$ (M^++1)

35

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Preparation 35

7-Octyloxy coumarin-3-carboxylic acid

IR (KBr) : 1748, 1625, 1558, 1467, 1430, 1386, 1360,
1257, 1217, 1120 cm^{-1}

5 NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.8\text{Hz}$), 1.2-1.5
(10H, m), 1.6-1.8 (2H, m), 4.11 (2H, t,
 $J=6.4\text{Hz}$), 6.9-7.1 (2H, m), 7.82 (1H, d,
 $J=8.9\text{Hz}$), 8.72 (1H, s), 12.98 (1H, br)

APCI-MASS : $m/z = 319$ (M^++1)

10

Preparation 36

4-(4-Pentyloxyphenyl)cinnamic acid

IR (Nujol) : 2923, 1675, 1500, 1290, 1223, 985,
821 cm^{-1}

15 NMR (DMSO- d_6 , δ) : 0.90 (3H, t, $J=7.0\text{Hz}$), 1.3-1.5
(4H, m), 1.6-1.8 (2H, m), 4.01 (2H, t, $J=6.5\text{Hz}$),
6.54 (1H, d, $J=16.0\text{Hz}$), 7.02 (2H, d, $J=8.8\text{Hz}$),
7.5-7.8 (7H, m)

APCI-MASS : $m/z = 311$ (M^++1)

20

Preparation 37

2-Nonylbenzoxazole-6-carboxylic acid

25 NMR (DMSO- d_6 , δ) : 0.84 (3H, t, $J=6.7\text{Hz}$), 1.2-1.5
(12H, m), 1.7-1.9 (2H, m), 2.96 (2H, t,
 $J=7.4\text{Hz}$), 7.76 (1H, d, $J=8.4\text{Hz}$), 7.98 (1H, d,
 $J=8.4\text{Hz}$), 8.19 (1H, s)

APCI-MASS : $m/z = 290$ (M^++1)Preparation 38

30 2-(4-Hexyloxyphenyl)benzimidazole-5-carboxylic acid

NMR (DMSO- d_6 , δ) : 0.8-1.0 (3H, m), 1.3-1.6 (6H, m),
1.7-1.8 (2H, m), 4.06 (2H, t, $J=6.4\text{Hz}$), 7.12
(2H, d, $J=8.8\text{Hz}$), 7.6-7.9 (2H, m), 8.1-8.2 (3H,
m), 13.00 (1H, br)

35 APCI-MASS : $m/z = 339$ (M^++1)

Preparation 39

2-Nonylbenzimidazole-5-carboxylic acid

NMR (DMSO-d₆, δ) : 0.85 (3H, t, J=6.7Hz), 1.1-1.4
(12H, m), 2.7-2.9 (2H, m), 2.96 (2H, t,
5 J=7.6Hz), 3.6-5.2 (1H, br), 7.66 (1H, d,
J=8.4Hz), 7.90 (1H, d, J=8.4Hz), 8.15 (1H, s)

APCI-MASS : m/z = 289 (M⁺+1)

Preparation 40

10 A solution of 4-[4-(4-Octyloxyphenyl)piperazin-1-yl]benzonitrile (0.5 g) in 20% H₂SO₄ aqueous solution (30 ml) and acetic acid (20 ml) was refluxed for 9 hours. The reaction mixture was pulverized with water. The precipitate was collected by filtration, and added to a
15 mixture of water, tetrahydrofuran and ethyl acetate, and adjusted to pH 2.5 with 1N NaOH aqueous solution. The organic layer was taken, and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure to give 4-[4-(4-
20 Octyloxyphenyl)piperazin-1-yl]benzoic acid (388 mg).

IR (KBr) : 2929, 1664, 1600, 1510, 1240 cm⁻¹

NMR (DMSO-d₆, δ) : 0.86 (3H, t, J=6.6Hz), 1.2-1.5
(10H, m), 1.5-1.8 (2H, m), 3.13 (4H, t,
J=5.3Hz), 3.44 (4H, t, J=5.3Hz), 3.88 (2H, t,
25 J=6.5Hz), 6.83 (2H, d, J=9.2Hz), 6.94 (2H, d,
J=9.2Hz), 7.02 (2H, d, J=9.0Hz), 7.79 (2H, d,
J=9.0Hz)

APCI-MASS : m/z = 411 (M⁺+1)

Preparation 41

30 To a suspension of sodium hydride (60% suspension in mineral oil) (0.296 g) in N,N-dimethylformamide (14 ml) was added 1,2,4-triazole (0.511 g) and 4-[4-(8-bromooctyloxy)phenyl]benzoic acid (1 g), and was stirred
35 for 5 hours at 120°C. The reaction mixture was added to a

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mixture of water and ethyl acetate, and adjusted to pH 2.5 with conc. hydrochloric acid. The organic layer was taken and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure to give 4-[4-[8-(1,2,4-Triazol-1-yl)octyloxy]phenyl]benzoic acid (0.81 g).

IR (KBr) : 2940, 1689, 1604, 1297, 1189 cm^{-1}

NMR (DMSO- d_6 , δ) : 1.1-1.53 (8H, m), 1.6-1.9 (4H, m), 4.00 (2H, t, $J=6.3\text{Hz}$), 4.16 (2H, t, $J=7.0\text{Hz}$), 7.03 (2H, d, $J=8.7\text{Hz}$), 7.67 (2H, d, $J=8.7\text{Hz}$), 7.75 (2H, d, $J=8.4\text{Hz}$), 7.95 (1H, s), 7.99 (2H, d, $J=8.4\text{Hz}$), 8.51 (1H, s), 12.9 (1H, s)

APCI-MASS : $m/z = 394 (M^++1)$

Preparation 42

A mixture of 2-Carbamoyl-5-methoxybenzo[b]thiophene (2.0 g), acetic acid (5 ml) and 48% hydrobromic acid (20 ml) was stirred for 16 hours at 110°C, and the mixture was poured into the ice-water. The resulting precipitate was collected by filtration, and dried to give 5-Hydroxybenzo[b]thiophene-2-carboxylic acid (1.66 g).

NMR (DMSO- d_6 , δ) : 7.03 (1H, dd, $J=8.8$ and 0.6Hz), 7.31 (1H, d, $J=0.6\text{Hz}$), 7.81 (1H, d, $J=8.8\text{Hz}$), 7.96 (1H, s), 9.64 (1H, s), 13.32 (1H, s)

APCI-MASS : $m/z = 195 (M^++1)$

Preparation 43

A solution of (S)-2-Tert-butoxycarbonyl-1,2,3,4-tetrahydro-7-hydroxyisoquinoline-3-carboxylic acid (1 g) in a mixture of 10% NaOH aqueous solution (2.73 ml) and dimethylsulfoxide (11 ml) was stirred for half an hour at 80°C. Then, octyl bromide (0.589 ml) was added thereto, and stirred for 4 hours at 60°C. The reaction mixture was added to a mixture of water and ethyl acetate, and

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adjusted to pH 2.5 with conc. hydrochloric acid. The organic layer was taken, and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure to give (S)-2-Tert-butoxycarbonyl-1,2,3,4-tetrahydro-7-octyloxyisoquinoline-3-carboxylic acid (1.30 g).

IR (Neat) : 2929, 1743, 1704, 1164 cm^{-1}

NMR (CDCl_3 , δ) : 0.89 (3H, t, $J=6.1\text{Hz}$), 1.1-1.6

(10H, m), 1.41 + 1.51 (9H, s, cis + trans), 1.75

(2H, quint, $J=6.5\text{Hz}$), 3.10 (2H, m), 3.90 (2H, t,

$J=3.9\text{Hz}$), 4.42 (1H, d, $J=16.8\text{Hz}$), 4.65 (1H, d,

$J=16.8\text{Hz}$), 4.74 + 5.09 (1H, m, cis + trans),

6.5-6.8 (2H, m), 7.03 (1H, d, $J=8.3\text{Hz}$)

APCI-MASS : m/z = 306 ($M^+ + 1$ -Boc)

The following compounds (Preparations 44 to 45) were obtained according to a similar manner to that of Preparation 43.

Preparation 44

5-Octyloxybenzo[b]thiophene-2-carboxylic acid

IR (KBr) : 1673, 1666, 1600, 1517, 1409, 1267, 1214, 1153, 865 cm^{-1}

NMR ($\text{DMSO}-d_6$, δ) : 0.86 (3H, t, $J=6.7\text{Hz}$), 1.2-1.5

(10H, m), 1.7-1.9 (2H, m), 4.02 (2H, t,

$J=6.4\text{Hz}$), 7.13 (1H, dd, $J=8.9$ and 0.6Hz), 7.51

(1H, d, $J=0.6\text{Hz}$), 7.90 (1H, d, $J=9.0\text{Hz}$), 7.99

(1H, s)

APCI-MASS : m/z = 307 ($M^+ + 1$)

Preparation 45

4-[4-(4-Hexyloxyphenyl)piperazin-1-yl]benzoic acid dihydrochloride

IR (KBr) : 1668, 1600, 1510, 1228 cm^{-1}

NMR ($\text{DMSO}-d_6$, δ) : 0.88 (3H, t, $J=6.9\text{Hz}$), 1.2-1.5

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(6H, m), 1.6-1.9 (2H, m), 3.0-3.2 (4H, m), 3.3-3.5 (4H, m), 3.88 (2H, t, $J=6.3\text{Hz}$), 6.83 (2H, d, $J=9\text{Hz}$), 6.9-7.1 (4H, m), 7.79 (2H, d, $J=8.8\text{Hz}$), 12.32 (1H, s)

5 APCI-MASS : $m/z = 383 (M+H^+)$

Preparation 46

To a suspension of dimethyl terephthalate (1.94 g) and potassium t-butoxide (2.24 g) in tetrahydrofuran (30 ml) was added 4-pentyloxyacetophenone (1.59 g) in tetrahydrofuran (10 ml) at 70°C dropwise. The mixture was refluxed for 30 minutes and poured into 1N HCl (50 ml). The mixture was extracted with ethyl acetate (100 ml) and the organic layer was washed with H₂O (100 ml), brine (100 ml) and evaporated under reduced pressure. The residue was triturated with acetonitrile (20 ml), collected by filtration and dried under reduced pressure to give 1-(4-Methoxycarbonylphenyl)-3-(4-pentyloxyphenyl)propane-1,3-dione (2.41 g) as yellow solid.

20 IR (KBr) : 3475, 2956, 2923, 1720, 1606, 1508, 1284, 1176, 1108, 769 cm^{-1}

NMR (CDCl_3 , δ) : 0.95 (3H, t, $J=7.0\text{Hz}$), 1.3-1.5 (4H, m), 1.7-2.0 (2H, m), 3.96 (3H, s), 4.04 (2H, t, $J=6.5\text{Hz}$), 6.82 (1H, s), 6.96 (2H, d, $J=8.9\text{Hz}$), 8.0-8.1 (4H, m), 8.14 (2H, m, $J=8.7\text{Hz}$), 12-13 (1H, br)

25 APCI-MASS : $m/z = 369 (M+H^+)$

Preparation 47

30 The solution of 1-(4-Methoxycarbonylphenyl)-3-(4-pentyloxyphenyl)propane-1,3-dione (1.00 g) and hydroxylamine hydrochloride (567 mg) in methanol (10 ml) was refluxed for 10 hours. The reaction mixture was diluted with ethyl acetate (50 ml) and washed with water (50 ml x 2), brine (50 ml). The organic layer was dried

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over magnesium sulfate and the solvents were removed under reduced pressure. The residue was triturated with acetonitrile (10 ml), collected by filtration, and dried under reduced pressure to give Methyl 4-[5-(4-pentyloxyphenyl)isoxazol-3-yl]benzoate (0.74 g).

IR (KBr) : 2942, 2873, 1716, 1616, 1508, 1280, 1108 cm^{-1}

NMR (CDCl_3 , δ) : 0.95 (3H, t, $J=6.9\text{Hz}$), 1.3-1.6 (4H, m), 1.8-2.0 (2H, m), 3.95 (3H, s), 4.02 (2H, t, $J=6.5\text{Hz}$), 6.74 (1H, s), 6.99 (2H, d, $J=8.8\text{Hz}$), 7.76 (2H, d, $J=8.8\text{Hz}$), 7.93 (2H, d, $J=8.5\text{Hz}$), 8.14 (2H, d, $J=8.5\text{Hz}$)

APCI-MASS : $m/z = 366$ ($M+H$)⁺

15 Preparation 48

A solution of 4-[4-(8-Bromooctyloxy)phenyl]benzoic acid (1 g) in a mixture of sodium methylate (28% solution in methanol) (10 ml) and N,N-dimethylformamide (5 ml) was refluxed for 5 hours. The reaction mixture was added to a mixture of water and ethyl acetate and adjusted to pH 2.0 with conc. HCl. The organic layer was taken and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure to give 4-[4-(8-Methoxyoctyloxy)phenyl]benzoic acid (0.77 g).

IR (KBr) : 2935, 1685, 835, 773 cm^{-1}

NMR (CDCl_3 , δ) : 1.27-1.7 (10H, m), 1.7-1.95 (2H, m), 3.34 (3H, s), 3.38 (2H, t, $J=6.4\text{Hz}$), 4.01 (2H, t, $J=6.5\text{Hz}$), 6.99 (2H, d, $J=8.7\text{Hz}$), 7.58 (2H, d, $J=8.7\text{Hz}$), 7.66 (2H, d, $J=8.4\text{Hz}$), 8.15 (2H, d, $J=8.4\text{Hz}$)

APCI-MASS : $m/z = 339$ ($M^+ + H - H_2O$)

Preparation 49

To a suspension of 1-Hydroxybenzotriazole (0.283 g)

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and 6-octyloxymethylpicolinic acid (0.505 g) in dichloromethane (15 ml) was added 1-ethyl-3-(3'-dimethylaminopropyl)carbodiimide hydrochloride (WSCD·HCl) (0.473 g), and stirred for 3 hours at ambient temperature. The reaction mixture was poured into water. The organic layer was taken, and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure to give 1-(6-Octyloxymethylpicolinoyl)benzotriazole 3-oxide (737 mg).

IR (Neat) : 1793, 1654, 1591, 1039 cm^{-1}

The following compounds [Preparations 50 to 66] were obtained according to a similar manner to that of Preparation 49.

Preparation 50

1-[4-(4-Octyloxyphenyl)piperazin-1-yl]benzoyl]-benzotriazole 3-oxide

IR (KBr) : 1783, 1600, 1511, 1232, 1184 cm^{-1}

NMR (CDCl_3 , δ) : 0.89 (3H, t, $J=6.6\text{Hz}$), 1.2-1.65 (10H, m), 1.65-1.9 (2H, m), 3.24 (4H, t, $J=5.3\text{Hz}$), 3.62 (4H, t, $J=5.3\text{Hz}$), 3.93 (2H, t, $J=6.5\text{Hz}$), 6.8-7.1 (6H, m), 7.35-7.63 (3H, m), 8.0-8.25 (3H, m)

Preparation 51

1-[4-[4-[8-(1,2,4-Triazol-1-yl)octyloxy]phenyl]-benzoyl]benzotriazole 3-oxide

IR (KBr) : 1776, 1600, 1193, 983 cm^{-1}

NMR (CDCl_3 , δ) : 1.2-2.0 (12H, m), 4.03 (2H, t, $J=6.4\text{Hz}$), 4.18 (2H, t, $J=7.1\text{Hz}$), 7.02 (2H, d, $J=8.7\text{Hz}$), 7.4-7.63 (3H, m), 7.63 (2H, d, $J=8.7\text{Hz}$), 7.79 (2H, d, $J=8.3\text{Hz}$), 7.95 (1H, s), 8.06 (1H, s), 8.12 (1H, d, $J=7.7\text{Hz}$), 8.32 (2H, d, $J=8.3\text{Hz}$)

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APCI-MASS : $m/z = 511$ ($M^+ + 1$)Preparation 52

1-[2-Methyl-2-(4-octyloxyphenoxy)propionyl]-
5 benzotriazole 3-oxide

IR (Neat) : 2927, 1810, 1504, 1047 cm^{-1} Preparation 53

1-[2-(4-Octyloxyphenoxy)propionyl]benzotriazole
10 3-oxide

IR (KBr) : 2954, 1812, 1513, 1232 cm^{-1} Preparation 54

1-[(S)-2-tert-Butoxycarbonyl-1,2,3,4-tetrahydro-7-
15 octyloxyisoquinolin-3-yl-carbonyl]benzotriazole 3-oxide

IR (Neat) : 2929, 1816, 1739, 1704, 1392 cm^{-1} Preparation 55

Succinimido 4-(4-n-octyloxyphenyl)piperazine-1-
20 carboxylate

IR (KBr) : 2925, 1758, 1743, 1513, 1241 cm^{-1}

NMR (CDCl_3 , δ) : 0.89 (3H, t, $J=6.8\text{Hz}$), 1.2-1.5
(10H, m), 1.65-1.85 (2H, m), 2.83 (4H, s),
3.0-3.2 (2H, m), 3.6-3.85 (2H, m), 3.91 (2H, t,
25 $J=6.5\text{Hz}$), 6.84 (2H, dd, $J=8.5$ and 2.7Hz), 6.90
(2H, dd, $J=8.5$ and 2.7Hz)

APCI-MASS : $m/z = 432$ ($M^+ + 1$)Preparation 56

(6-Heptyloxy-2-naphthyl)methylsuccinimido carbonate

IR (KBr) : 1878, 1832, 1787, 1735, 1209 cm^{-1}

NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.2\text{Hz}$), 1.2-1.6 (8H,
m), 1.73-2.0 (2H, m), 2.83 (4H, s), 4.07 (2H, t,
 $J=6.5\text{Hz}$), 5.44 (2H, s), 7.13 (1H, d, $J=2.4\text{Hz}$),
35 7.17 (1H, dd, $J=8.8$ and 2.4Hz), 7.44 (1H, dd,

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J=8.4 and 1.6Hz), 7.67-7.85 (3H, m)

Preparation 57

1-(3,4-Dipentyloxybenzoyl)benzotriazole 3-oxide

5 IR (KBr) : 2952, 1774, 1594, 1515, 1430, 1272, 1147,
1089 cm^{-1}

NMR (CDCl_3 , δ) : 0.9-1.1 (6H, m), 1.3-1.6 (8H, m),
1.8-2.1 (4H, m), 4.0-4.2 (4H, m), 6.99 (1H, d,
J=8.5Hz), 7.4-7.6 (3H, m), 7.68 (1H, d,
10 J=2.0Hz), 7.92 (1H, dd, J=8.5 and 2.0Hz), 8.10
(1H, d, J=8.5Hz)

APCI-MASS : $m/z = 412 (M^+ + 1)$ Preparation 5815 1-(7-Octyloxycoumarin-3-yl-carbonyl)benzotriazole
3-oxide

IR (KBr) : 2925, 1754, 1716, 1610, 1548, 1282, 1199,
1172, 1139, 1064, 781, 750 cm^{-1}

20 NMR ($\text{DMSO}-d_6$, δ) : 0.86 (3H, t, J=7.8Hz), 1.2-1.5
(10H, m), 1.6-1.8 (2H, m), 4.11 (2H, t,
J=6.5Hz), 6.9-7.1 (2H, m), 7.41 (1H, t,
J=7.2Hz), 7.54 (1H, t, J=7.2Hz), 7.72 (1H, d,
J=8.3Hz), 7.82 (1H, d, J=8.3Hz), 7.99 (1H, d,
J=8.3Hz), 8.72 (1H, s)

25 APCI-MASS : $m/z = 436 (M^+ + 1)$

Preparation 591-[4-(4-Pentyloxyphenyl)cinnamoyl]benzotriazole 3-
oxide

30 IR (Nujol) : 2854, 1778, 1708, 1620, 1597, 1494,
1459, 1434, 1377, 1350, 1250, 1188, 1138, 1086,
978 cm^{-1}

Preparation 60

35 1-(5-Octyloxybenzo[b]thiophen-2-yl-carbonyl)-

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benzotriazole 3-oxide

IR (KBr) : 2950, 1776, 1517, 1342, 1211, 1151 cm^{-1}

NMR (DMSO-d_6 , δ) : 0.86 (3H, t, $J=6.7\text{Hz}$), 1.2-1.5
(10H, m), 1.7-1.9 (2H, m), 4.01 (2H, t,
5 $J=6.4\text{Hz}$), 7.13 (1H, dd, $J=8.8$ and 2.4Hz), 7.42
(1H, d, $J=7.1\text{Hz}$), 7.5-7.6 (3H, m), 7.72 (1H, d,
 $J=8.4\text{Hz}$), 7.89 (1H, d, $J=8.8\text{Hz}$), 7.9-8.1 (2H, m)

APCI-MASS : $m/z = 424$ (M^++1)10 Preparation 611-(3-Methyl-5-octylbenzo[b]furan-2-yl-carbonyl)-
benzotriazole 3-oxideIR (KBr) : 1776, 1575, 1469, 1363, 1324, 1276, 1114,
1027 cm^{-1}

15 NMR (CDCl_3 , δ) : 0.89 (3H, t, $J=6.7\text{Hz}$), 1.2-1.5
(10H, m), 2.6-2.8 (2H, m), 2.71 (3H, s), 2.76
(2H, t, $J=7.4\text{Hz}$), 7.4-7.6 (6H, m), 8.12 (1H, s)

APCI-MASS : $m/z = 406$ (M^++1)20 Preparation 621-(2-Nonylbenzoxazol-5-yl-carbonyl)benzotriazole
3-oxideIR (KBr) : 2980, 1783, 1623, 1573, 1276, 1151, 1091,
989 cm^{-1}

25 NMR (DMSO-d_6 , δ) : 0.84 (3H, t, $J=6.8\text{Hz}$), 1.1-1.4
(12H, m), 1.81 (2H, t, $J=7.2\text{Hz}$), 2.96 (3H, t,
 $J=7.4\text{Hz}$), 7.41 (1H, t, $J=7.0\text{Hz}$), 7.54 (1H, t,
 $J=7.0\text{Hz}$), 7.74 (2H, t, $J=7.0\text{Hz}$), 7.98 (2H, d,
 $J=7.0\text{Hz}$), 8.19 (1H, s)

30 APCI-MASS : $m/z = 407$ (M^++1)Preparation 631-[2-(4-Hexyloxyphenyl)benzimidazol-5-yl-carbonyl]-
benzotriazole 3-oxide

35 IR (KBr) : 3160, 2931, 2863, 1778, 1612, 1502, 1448,

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1388, 1294, 1247, 1174, 1097, 1010, 732 cm^{-1}

NMR (DMSO-d_6 , δ) : 0.89 (3H, t, $J=6.7\text{Hz}$), 1.2-1.5
(6H, m), 1.7-1.8 (2H, m), 4.08 (2H, t, $J=6.4\text{Hz}$),
7.16 (2H, d, $J=8.7\text{Hz}$), 7.6-8.4 (9H, m), 8.3-8.6
(1H, br)

APCI-MASS : $m/z = 456$ (M^++1)Preparation 64

1-[4-[4-(8-Methoxyoctyloxy)phenyl]benzoyl]-
benzotriazole-3-oxide

IR (KBr) : 2931, 1793, 1770, 1600 cm^{-1}

NMR (CDCl_3 , δ) : 1.2-1.7 (10H, m), 1.7-1.93 (2H, m),
3.34 (3H, s), 3.38 (2H, t, $J=6.4\text{Hz}$), 4.03 (2H,
t, $J=6.5\text{Hz}$), 7.03 (2H, d, $J=8.8\text{Hz}$), 7.4-7.7 (3H,
m), 7.63 (2H, d, $J=8.8\text{Hz}$), 7.79 (2H, d,
 $J=8.6\text{Hz}$), 8.12 (1H, d, $J=8.2\text{Hz}$), 8.32 (2H, d,
 $J=8.6\text{Hz}$)

Preparation 65

1-[4-[4-(4-Hexyloxyphenyl)piperazin-1-
yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 1770, 1604, 1510, 1232, 1186 cm^{-1}

NMR (CDCl_3 , δ) : 0.91 (3H, t, $J=6.6\text{Hz}$), 1.2-1.6 (6H,
m), 1.6-1.9 (2H, m), 3.1-3.3 (4H, m), 3.5-3.7
(4H, m), 3.93 (2H, t, $J=6.5\text{Hz}$), 6.87 (2H, d,
 $J=9.2\text{Hz}$), 6.96 (2H, d, $J=9.2\text{Hz}$), 7.00 (2H, d,
 $J=9.0\text{Hz}$), 7.3-7.7 (3H, m), 8.10 (1H, d,
 $J=8.2\text{Hz}$), 8.15 (2H, d, $J=9.0\text{Hz}$)

APCI-MASS : $m/z = 500$ ($M+H^+$)Preparation 66

1-[4-[5-(4-Pentyloxyphenyl)isoxazol-3-yl]benzoyl]-
benzotriazole 3-oxide

IR (KBr) : 2950, 2837, 1774, 1616, 1508, 1452, 1251,
1006 cm^{-1}

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NMR (CDCl₃, δ) : 0.95 (3H, t, J=7.1Hz), 1.3-1.5 (4H, m), 1.8-2.0 (2H, m), 4.04 (2H, t, J=6.5Hz), 6.81 (1H, s), 7.0-7.1 (3H, m), 7.4-7.6 (3H, m), 7.80 (2H, d, J=8.8Hz), 8.0-8.2 (3H, m), 8.40 (2H, d, J=8.4Hz)

APCI-MASS : m/z = 469 (M+H)⁺

Preparation 67

To a suspension of 1-hydroxybenzotriazole (0.20 g) and 4-(4-pentylphenyl)cinnamic acid (0.40 g) in dichloromethane (12.0 ml) was added 1-ethyl-3-(3'-dimethylaminopropyl)carbodiimide hydrochloride (0.33 g) (WSCD-HCl), and the mixture was stirred for 12 hours at ambient temperature. The reaction mixture was diluted with dichloromethane, and washed with brine, and dried over magnesium sulfate. After magnesium sulfate was filtered off, evaporation of the filtrate and trituration with acetonitrile gave 1-[4-(4-Pentylphenyl)cinnamoyl]benzotriazole 3-oxide (0.24 g).

NMR (CDCl₃, δ) : 0.91 (3H, t, J=6.6Hz), 1.20-1.50 (4H, m), 1.50-1.75 (2H, m), 2.66 (2H, t, J=8.0Hz), 7.20-8.25 (11H, m), 8.55 (1H, d, J=8.4Hz)

APCI-MASS : m/z = 412 (M⁺+1)

The following compounds (Preparations 68 to 73) were obtained according to a similar manner to that of Preparation 67.

Preparation 68

1-[3-[4-(4-Pentyloxyphenyl)phenyl]-2-propanoyl]-benzotriazole 3-oxide

NMR (CDCl₃, δ) : 0.90-1.05 (3H, m), 1.30-1.65 (4H, m), 1.70-1.95 (2H, m), 3.10-3.60 (4H, m), 3.90-4.10 (2H, m), 6.88-7.08 (2H, m),

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7.20-8.50 (10H, m)

APCI-MASS : $m/z = 430 (M^+ + 1)$ Preparation 69

5 1-[4-(4-Heptylphenyl)cinnamoyl]benzotriazole 3-oxide

NMR (CDCl₃, δ) : 0.89 (3H, t, J=6.7Hz), 1.20-1.50

(8H, m), 1.50-1.80 (2H, m), 2.66 (2H, t,

J=7.6Hz), 6.70-8.60 (12H, m)

APCI-MASS : $m/z = 440 (M^+ + 1)$

10

Preparation 701-[3-[4-(4-Pentylphenyl)phenyl]-2-propanoyl]-
benzotriazole 3-oxideNMR (CDCl₃, δ) : 0.90 (3H, t, J=6.8Hz), 1.20-1.50

15 (4H, m), 1.50-1.76 (2H, m), 2.63 (2H, t,

J=7.4Hz), 3.21 (2H, t, J=7.3Hz), 3.51 (2H, t,

J=7.3Hz), 7.20-7.45 (4H, m), 7.45-7.70 (5H, m),

7.78 (1H, dt, J=1.0 and 7.2Hz), 8.00 (1H, d,

J=8.2Hz), 8.42 (1H, d, J=8.4Hz)

20 APCI-MASS : $m/z = 414 (M^+ + 1)$ Preparation 711-[3-(6-Heptyloxynaphthalen-2-yl)propanoyl]-
benzotriazole 3-oxide25 NMR (CDCl₃, δ) : 0.80-1.10 (3H, m), 1.20-1.70 (8H,
m), 1.70-2.00 (2H, m), 3.10-3.70 (4H, m), 4.00-
4.18 (2H, m), 6.80-8.50 (10H, m)APCI-MASS : $m/z = 432 (M^+ + 1)$ 30 Preparation 721-[3-(6-Heptyloxynaphthalen-2-yl)propenoyl]-
benzotriazole 3-oxideNMR (CDCl₃, δ) : 0.90 (3H, t, J=6.5Hz), 1.20-1.65

(8H, m), 1.75-1.95 (2H, m), 4.10 (2H, d,

35 J=6.5Hz), 6.75-8.62 (8H, m)

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APCI-MASS : $m/z = 430$ ($M^+ + 1$)Preparation 73

1-(4-Hexylphenylbenzoyl)benzotriazole 3-oxide

5 NMR ($CDCl_3$, δ) : 0.90 (3H, t, $J=4.4$ Hz), 1.2-1.5 (6H, m), 1.6-1.8 (2H, m), 2.68 (2H, t, $J=8.0$ Hz), 7.32 (2H, d, $J=8.2$ Hz), 7.4-7.7 (5H, m), 7.81 (2H, d, $J=6.6$ Hz), 8.10 (2H, d, $J=8.1$ Hz), 8.32 (2H, d, $J=7.6$ Hz)

10 APCI-MASS : $m/z = 400$ ($M^+ + 1$)

Preparation 74

To a solution of 4-octyloxyphenol (1 g) in dimethylformamide (10 ml) and pyridine (0.364 ml) was added
15 N,N'-disuccinimidylcarbonate (1.16 g). The mixture was stirred for 12 hours at ambient temperature. The reaction mixture was added to a mixture of water and ethyl acetate. The organic layer was taken, and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the
20 filtrate was evaporated under reduced pressure to give 4-Octyloxyphenylsuccinimidyl carbonate (0.59 g).

IR (KBr) : 2927, 1876, 1832, 1735 cm^{-1}

NMR ($CDCl_3$, δ) : 0.89 (3H, t, $J=6.3$ Hz), 1.2-1.55 (10H, m), 1.67-1.87 (2H, m), 2.87 (4H, s), 3.94
25 (2H, t, $J=6.5$ Hz), 6.89 (2H, d, $J=9.2$ Hz), 7.17 (2H, d, $J=9.2$ Hz)

APCI-MASS : $m/z = 364$ ($M^+ + 1$)

The following compounds (Preparations 75 to 88) were
30 obtained according to a similar manner to that of Preparation 1.

Preparation 75

Methyl 4-[4-(6-phenylpyridazin-3-yl-oxy)phenyl]benzoate

35 IR (KBr) : 1708, 1427, 1280, 1187, 1112 cm^{-1}

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NMR (CDCl₃, δ) : 3.95 (3H, s), 7.2-7.7 (10H, m),

7.92 (1H, d, J=9.2Hz), 8.0-8.2 (4H, m)

APCI-MASS : m/z = 383 (M+H)⁺

5 Preparation 76

Methyl 4-[4-(5-bromopentyloxy)phenyl]benzoate

IR (KBr) : 2946, 2871, 1716, 1602, 1294, 1199, 1112,
837 cm⁻¹

NMR (CDCl₃, δ) : 1.7-2.0 (6H, m), 3.45 (2H, t,

10 J=6.7Hz), 3.93 (3H, s), 4.02 (2H, t, J=6.1Hz), 6.97

(2H, d, J=8.7Hz), 7.56 (2H, d, J=8.7Hz), 7.61 (2H,

d, J=8.3Hz), 8.07 (2H, d, J=8.3Hz)

APCI-MASS : m/z = 378 (M+H)⁺

15 Preparation 77

Methyl 4-[4-(5-phenoxy-pentyloxy)phenyl]benzoate

IR (KBr) : 2944, 2931, 1720, 1600, 1492, 1197,
1110 cm⁻¹

NMR (CDCl₃, δ) : 1.6-1.8 (2H, m), 1.8-2.0 (4H, m),

20 3.93 (3H, s), 4.00 (2H, t, J=6.3Hz), 4.04 (2H, t,

J=6.3Hz), 6.9-7.1 (5H, m), 7.3-7.4 (2H, m), 7.56

(2H, d, J=8.7Hz), 7.62 (2H, d, J=8.3Hz), 8.07 (2H,

d, J=8.3Hz)

APCI-MASS : m/z = 391 (M+H)⁺

25

Preparation 78

1-[2-(4-Cyclohexylphenylamino)ethyl]-2-oxazolidone
hydrochloride

IR (KBr) : 2923.6, 2852.2, 1747.2, 1683.6 cm⁻¹

30 NMR (DMSO-d₆, δ) : 1.1-1.5 (6H, m), 1.6-1.9 (4H, m),

2.3-2.6 (1H, m), 3.3-3.5 (4H, m), 3.58 (2H, dd,

J=9.4 and 7.4Hz), 4.22 (2H, dd, J=9.4 and 7.4Hz),

7.1-7.4 (4H, m)

35 Preparation 79

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Methyl 4-[4-(8-hydroxyoctyloxy)phenyl]benzoate

IR (KBr) : 3250, 2933, 2856, 1724, 1602, 1436, 1292,
1199 cm^{-1}

5 NMR (CDCl_3 , δ) : 1.3-1.9 (12H, m), 3.6-3.8 (2H, br),
3.93 (3H, s), 4.00 (2H, t, $J=6.7\text{Hz}$), 4.82 (1H, s),
7.68 (2H, d, $J=8.7\text{Hz}$), 7.56 (2H, d, $J=8.7\text{Hz}$), 7.62
(2H, d, $J=8.3\text{Hz}$), 8.07 (2H, d, $J=8.3\text{Hz}$)

APCI-MASS : $m/z = 357$ ($\text{M}+\text{H}^+$)10 Preparation 80

Methyl 4-[4-(6-bromohexyloxy)phenyl]benzoate

IR (KBr) : 2937, 2861, 1724, 1602, 1529, 1436, 1292,
1199, 1112 cm^{-1}

15 NMR (CDCl_3 , δ) : 1.5-2.0 (8H, m), 3.43 (2H, t,
 $J=6.8\text{Hz}$), 3.93 (3H, s), 4.02 (2H, t, $J=6.3\text{Hz}$), 6.98
(2H, d, $J=8.8\text{Hz}$), 7.56 (2H, d, $J=8.8\text{Hz}$), 7.62 (2H,
d, $J=8.4\text{Hz}$), 8.07 (2H, d, $J=8.4\text{Hz}$)

APCI-MASS : $m/z = 391$ ($\text{M}+\text{H}^+$)20 Preparation 81

4-[4-(5-Bromopentyloxy)phenyl]bromobenzene

IR (KBr) : 2942, 2867, 1604, 1515, 1477, 1286 cm^{-1}

25 NMR (CDCl_3 , δ) : 1.5-2.0 (6H, m), 3.44 (2H, t,
 $J=6.7\text{Hz}$), 3.99 (2H, t, $J=6.2\text{Hz}$), 6.95 (2H, d,
 $J=8.7\text{Hz}$), 7.3-7.6 (6H, m)

APCI-MASS : $m/z = 399$ ($\text{M}+\text{H}^+$)Preparation 82

30 8-[4-(4-Methoxycarbonylphenyl)phenoxy]octanoyl
piperidine

IR (KBr) : 2935, 2852, 1720, 1639, 1604, 1438,
1292 cm^{-1}

35 NMR (CDCl_3 , δ) : 1.3-1.9 (16H, m), 2.34 (2H, d,
 $J=7.6\text{Hz}$), 3.4-3.6 (4H, m), 3.93 (3H, s), 3.99 (2H,
t, $J=6.4\text{Hz}$), 6.97 (2H, d, $J=8.8\text{Hz}$), 7.55 (2H, d,

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J=8.8Hz), 7.61 (2H, d, J=8.6Hz), 8.07 (2H, d,
J=8.6Hz)

APCI-MASS : m/z = 438 (M+H⁺)

5 Preparation 83

Methyl 6-[4-(4-n-heptyloxyphenyl)piperazin-1-
yl]nicotinate

IR (KBr) : 2933, 2859, 1726, 1608, 1513, 1430,
1280, 1245 cm⁻¹

10 NMR (CDCl₃, δ) : 0.89 (3H, t, J=6.7Hz), 1.2-1.8 (10H,
m), 3.17 (4H, t, J=4.9Hz), 3.8-4.0 (9H, m), 6.65
(1H, d, J=9.1Hz), 6.86 (2H, d, J=9.1Hz), 6.96 (2H,
d, J=9.1Hz), 8.05 (1H, dd, J=9.1 and 2.3Hz), 8.82
(1H, d, J=2.3Hz)

15 APCI-MASS : m/z = 412 (M+H⁺)

Preparation 84

Methyl 6-[4-[4-(8-bromooctyloxy)phenyl]piperazin-1-
yl]nicotinate

20 IR (KBr) : 2933, 2861, 1724, 1608, 1513, 1430,
1280 cm⁻¹

NMR (CDCl₃, δ) : 1.2-2.0 (12H, m), 3.17 (4H, t,
J=5.0Hz), 3.40 (2H, t, J=6.8Hz), 3.8-4.0 (9H, m),
6.64 (1H, d, J=9.0Hz), 6.85 (2H, d, J=9.1Hz), 6.96
25 (2H, d, J=9.1Hz), 8.05 (1H, dd, J=9.0 and 2.2Hz),
8.82 (1H, d, J=2.2Hz)

APCI-MASS : m/z = 504 (M+H⁺)

Preparation 85

30 4-[4-(7-Bromoheptyloxy)phenyl]bromobenzene

IR (KBr) : 2935.1, 2856.1, 1604.5 cm⁻¹

NMR (CDCl₃, δ) : 1.18-1.65 (6H, m), 1.70-2.02 (4H, m),
3.41 (2H, t, J=6.8Hz), 3.99 (2H, t, J=6.4Hz), 6.95
(2H, d, J=8.6Hz), 7.40 (2H, d, J=8.6Hz), 7.46 (2H,
35 d, J=8.6Hz), 7.52 (2H, d, J=8.6Hz)

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Preparation 86

4-[4-(8-Bromooctyloxy)phenyl]bromobenzene

NMR (CDCl₃, δ) : 1.22-1.65 (8H, m), 1.65-1.95 (4H, m),
3.41 (2H, t, J=6.8Hz), 3.99 (2H, t, J=6.4Hz), 6.95
5 (2H, d, J=8.6Hz), 7.40 (2H, d, J=8.6Hz), 7.46 (2H,
d, J=8.6Hz), 7.52 (2H, d, J=8.6Hz)

Preparation 87

Methyl (E)-3-[4-[4-(5-hexenyloxy)phenyl]phenyl]acrylate

10 NMR (CDCl₃, δ) : 1.50-1.72 (2H, m), 1.72-1.95 (2H, m),
2.05-2.14 (2H, m), 3.82 (3H, s), 4.01 (2H, t,
J=6.3Hz), 4.95-5.10 (2H, m), 5.70-5.93 (1H, m),
6.46 (1H, d, J=16Hz), 6.97 (2H, d, J=8.7Hz), 7.54
15 (2H, d, J=8.7Hz), 7.58 (4H, s), 7.72 (1H, d,
J=16Hz)

APCI-MASS : m/z = 337 (M⁺+1)Preparation 88

4-Bromo-4'-(4-methylpentyloxy)biphenyl

20 IR (KBr) : 2956.3, 2871.5, 1606.4 cm⁻¹

NMR (CDCl₃, δ) : 0.93 (6H, d, J=6.6Hz), 1.25-1.45 (2H,
m), 1.62 (1H, sept, J=6.6Hz), 1.72-1.93 (2H, m),
3.98 (2H, t, J=6.6Hz), 6.95 (2H, d, J=8.6Hz), 7.30-
7.60 (6H, m)

25 APCI-MASS : m/z = 332, 334 (M⁺, M⁺+2)

The following compounds (Preparations 89 to 90) were
obtained according to a similar manner to that of Preparation
2.

Preparation 89N-[4-[2-(4-Methylpentyl)-2,3-dihydro-4H-1,2,4-triazol-3-
one-4-yl]phenyl]piperazine ditrifluoroacetateIR (KBr) : 1668.1, 1519.6, 1203.4, 1176.4, 1130.1 cm⁻¹35 NMR (DMSO-d₆, δ) : 0.86 (6H, d, J=6.6Hz), 1.1-1.3 (2H,

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m), 1.4-1.8 (3H, m), 3.1-3.3 (4H, m), 3.3-3.5 (4H, m), 3.70 (2H, t, J=7.0Hz), 7.11 (2H, d, J=9.0Hz), 7.53 (2H, d, J=9.0Hz), 8.35 (1H, s), 8.90 (2H, s)

5 Preparation 90

1-(4-Phenylcyclohexyl)piperazine ditrifluoroacetate

IR (KBr) : 1677.8, 1197.6, 1133.9 cm^{-1}

NMR (DMSO- d_6 , δ) : 1.4-1.8 (4H, m), 1.8-2.25 (4H, m),
2.4-2.7 (1H, m), 3.2-3.7 (9H, m), 4.54 (2H, br s),
7.0-7.4 (5H, m), 9.32 (1H, br s)

APCI-MASS : m/z = 245 ($M^+ + H$)

The following compounds (Preparations 91 to 103) were
obtained according to a similar manner to that of Preparation
3.

15 Preparation 91

Methyl 6-[4-(4-octyloxyphenyl)piperazin-1-yl]nicotinate

IR (KBr) : 2923, 1726, 1608, 1515, 1278, 1116 cm^{-1}

NMR (CDCl_3 , δ) : 0.88 (3H, t, J=6.8Hz), 1.2-1.5 (10H, m),
1.7-1.8 (2H, m), 3.1-3.2 (4H, m), 3.8-4.0 (9H, m), 6.64 (1H, d, J=9.0Hz), 6.8-7.0 (4H, m), 8.04
(1H, dd, J=9.0 and 2.4Hz), 8.81 (1H, d, J=2.4Hz)

APCI-MASS : m/z = 426 ($M + H^+$)

25 Preparation 92

4-[4-[4-[2-(4-Methylpentyl)-2,3-dihydro-4H-1,2,4-triazol-3-one-4-yl]phenyl]piperazin-1-yl]benzonitrile

IR (KBr) : 2217.7, 1685.5 cm^{-1}

NMR (CDCl_3 , δ) : 0.90 (6H, d, J=6.6Hz), 1.2-1.4 (2H, m),
1.5-2.0 (3H, m), 3.3-3.4 (4H, m), 3.4-3.6 (4H, m), 3.83 (2H, t, J=7.4Hz), 6.92 (2H, d, J=9.0Hz),
7.01 (2H, d, J=9.0Hz), 7.43 (2H, d, J=9.0Hz), 7.54 (2H, d, J=9.0Hz), 7.62 (1H, s)

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Preparation 93

3-Fluoro-4-[4-(4-methoxyphenyl)piperazin-1-yl]benzonitrile

IR (KBr) : 2225.5, 1510.0, 1240.0 cm^{-1}

5 NMR (CDCl_3 , δ) : 3.1-3.55 (8H, m), 3.79 (3H, s),
6.7-7.1 (6H, m), 7.3-7.5 (1H, m)

Preparation 94

10 3-Chloro-4-[4-(4-n-hexyloxyphenyl)piperazin-1-yl]benzonitrile

IR (KBr) : 2223.5, 1592.9, 1510.0, 1490.7, 1236.1 cm^{-1}

15 NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.7\text{Hz}$), 1.3-1.6 (6H, m), 1.7-1.9 (2H, m), 3.2-3.4 (8H, m), 3.92 (2H, t, $J=6.6\text{Hz}$), 6.85 (2H, d, $J=9.3\text{Hz}$), 6.94 (2H, d, $J=9.3\text{Hz}$), 7.08 (1H, d, $J=8.4\text{Hz}$), 7.53 (1H, dd, $J=8.4$ and 1.9Hz), 7.64 (1H, d, $J=1.9\text{Hz}$)

APCI-MASS : $m/z = 398$ ($M^+ + H$)

Preparation 95

20 Ethyl 3-[4-(4-n-hexyloxyphenyl)piperazin-1-yl]-6-pyridazinecarboxylate

IR (KBr) : 1729.8, 1587.1, 1511.9, 1245.8 cm^{-1}

25 NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.5\text{Hz}$), 1.2-1.4 (6H, m), 1.44 (3H, t, $J=7.1\text{Hz}$), 1.65-1.85 (2H, m), 3.1-3.25 (4H, m), 3.8-4.0 (6H, m), 4.46 (2H, q, $J=7.1\text{Hz}$), 6.8-7.0 (5H, m), 7.91 (1H, d, $J=9.6\text{Hz}$)

APCI-MASS : $m/z = 413$ ($M^+ + H$)

Preparation 96

30 4-(4-Piperidinopiperidin-1-yl)benzonitrile

IR (KBr) : 2217.7, 1602.6, 1511.9 cm^{-1}

35 NMR (CDCl_3 , δ) : 1.35-1.75 (8H, m), 1.92 (2H, d, $J=12.9\text{Hz}$), 2.3-2.6 (5H, m), 2.86 (2H, td, $J=12.8$ and 2.6Hz), 3.90 (2H, d, $J=12.8\text{Hz}$), 6.84 (2H, d, $J=9.1\text{Hz}$), 7.46 (2H, d, $J=9.1\text{Hz}$)

APCI-MASS : $m/z = 270$ ($M^+ + H$)

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Preparation 97

5-[4-(4-n-Hexyloxyphenyl)piperazin-1-yl]picolinonitrile

IR (KBr) : 2223.5, 1575.6, 1511.9, 1241.9 cm^{-1}

5 NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.5\text{Hz}$), 1.2-1.55 (6H, m), 1.7-1.85 (2H, m), 3.22 (4H, t, $J=5.1\text{Hz}$), 3.52 (4H, t, $J=5.1\text{Hz}$), 3.92 (2H, t, $J=6.5\text{Hz}$), 6.86 (2H, d, $J=9.4\text{Hz}$), 6.93 (2H, d, $J=9.4\text{Hz}$), 7.13 (1H, dd, $J=8.8$ and 3.0Hz), 7.53 (1H, d, $J=8.8\text{Hz}$), 8.35 (1H, d, $J=3.0\text{Hz}$)

10 APCI-MASS : $m/z = 365$ ($M^+ + H$)

Preparation 98

4-[4-(4-Cyclohexylphenyl)piperazin-1-yl]benzonitrile

IR (KBr) : 2219.7, 1606.4, 1513.8, 1238.1 cm^{-1}

15 NMR (CDCl_3 , δ) : 1.1-1.5 (6H, m), 1.65-2.0 (4H, m), 2.44 (1H, m), 3.30 (4H, t, $J=5.1\text{Hz}$), 3.46 (4H, t, $J=5.1\text{Hz}$), 6.90 (4H, d, $J=8.9\text{Hz}$), 7.14 (2H, d, $J=8.9\text{Hz}$), 7.52 (2H, d, $J=8.9\text{Hz}$)

20 APCI-MASS : $m/z = 346$ ($M^+ + H$)

Preparation 99

4-[4-(4-n-Hexylphenyl)piperazin-1-yl]benzonitrile

IR (KBr) : 2925.5, 2850.3, 2213.9, 1604.5, 1513.8, 1234.2, 944.9 cm^{-1}

25 NMR (CDCl_3 , δ) : 0.88 (3H, t, $J=6.4\text{Hz}$), 1.2-1.45 (6H, m), 1.45-1.7 (2H, m), 2.54 (2H, t, $J=7.6\text{Hz}$), 3.2-3.4 (4H, m), 3.4-3.6 (4H, m), 6.89 (2H, d, $J=8.5\text{Hz}$), 6.91 (2H, d, $J=8.9\text{Hz}$), 7.11 (2H, d, $J=8.5\text{Hz}$), 7.52 (2H, d, $J=8.9\text{Hz}$)

30

Preparation 100

1-[2-(4-n-Hexylphenylamino)ethyl]-2-oxazolidone
hydrochloride

IR (KBr) : 2925.5, 2852.2, 1753.0, 1729.8, 1267.0 cm^{-1}

35 NMR ($\text{DMSO}-d_6$, δ) : 0.85 (3H, t, $J=6.5\text{Hz}$), 1.1-1.4 (6H, m)

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m), 1.45-1.7 (2H, m), 2.56 (2H, t, J=7.6Hz), 3.3-3.53 (4H, m), 3.57 (2H, t, J=7.9Hz), 4.24 (2H, t, J=7.9Hz), 7.24 (4H, s)

APCI-MASS : m/z = 291 (M⁺+H)

5

Preparation 101

4-[4-(4-Phenylcyclohexyl)piperazin-1-yl]benzonitrile

IR (KBr) : 2212.0, 1602.6, 1513.8, 1249.6 cm⁻¹

NMR (CDCl₃, δ) : 1.3-1.8 (4H, m), 1.9-2.2 (4H, m),
2.3-2.6 (2H, m), 2.75 (4H, t, J=5.0Hz), 3.34 (4H, t, J=5.0Hz), 6.86 (2H, d, J=8.9Hz), 7.1-7.4 (5H, m), 7.49 (2H, d, J=8.9Hz)

10

APCI-MASS : m/z = 346 (M⁺+H)

15

Preparation 102

Methyl 6-[4-(4-hydroxyphenyl)piperazin-1-yl]nicotinate

IR (KBr) : 3411, 1691, 1602, 1510, 1432, 1249,
1147 cm⁻¹

NMR (DMSO-d₆, δ) : 3.0-3.1 (4H, m), 3.7-3.9 (7H, m),
6.67 (2H, d, J=8.8Hz), 6.84 (2H, d, J=8.8Hz), 6.93 (1H, d, J=9.1Hz), 7.97 (1H, dd, J=2.4 and 9.1Hz),
8.66 (1H, d, J=2.4Hz), 8.88 (1H, s)

20

APCI-MASS : m/z = 314 (M+H)⁺

25

Preparation 103

1-n-Decylindole-5-carboxylic acid

IR (KBr) : 2921, 2854, 1679, 1612, 1427, 1313,
1199 cm⁻¹

NMR (DMSO-d₆, δ) : 0.84 (3H, t, J=6.8Hz), 1.1-1.3 (14H, m), 1.6-1.8 (2H, m), 4.19 (2H, t, J=6.9Hz),
6.57 (1H, s), 7.4-7.8 (3H, m), 8.23 (1H, s), 12.40 (1H, s)

30

APCI-MASS : m/z = 302 (M+H⁺)

35

The following compounds (Preparations 104 to 111) were

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obtained according to a similar manner to that of Preparation 10.

Preparation 104

(E)-Methyl 4-(4-n-butoxyphenyl)cinnamate

IR (KBr) : 2958, 2939, 2873, 1720, 1637, 1498, 1313,
1195, 1170 cm^{-1}

NMR (CDCl_3 , δ) : 0.98 (3H, t, $J=7.3\text{Hz}$), 1.4-1.8 (4H, m), 3.81 (3H, s), 4.00 (2H, t, $J=6.4\text{Hz}$), 6.45 (1H, d, $J=16.0\text{Hz}$), 6.97 (2H, d, $J=8.7\text{Hz}$), 7.5-7.7 (6H, m), 7.72 (1H, d, $J=16.0\text{Hz}$)

APCI-MASS : $m/z = 311$ ($M+H^+$)

Preparation 105

Methyl (E)-3-[4-[4-(4-methylpentyloxy)phenyl]phenyl]-acrylate

IR (KBr) : 2956.3, 2873.4, 1720.2, 1635.3, 1600.6 cm^{-1}

NMR (CDCl_3 , δ) : 0.93 (6H, d, $J=6.5\text{Hz}$), 1.28-1.50 (2H, m), 1.50-1.95 (3H, m), 3.82 (3H, s), 3.99 (2H, t, $J=6.6\text{Hz}$), 6.44 (1H, d, $J=16.0\text{Hz}$), 6.97 (2H, d, $J=8.7\text{Hz}$), 7.49-7.65 (6H, m), 7.71 (1H, d, $J=16\text{Hz}$)

APCI-MASS : $m/z = 339$ (M^++1)

Preparation 106

Methyl (E)-3-[4-[4-(6-fluorohexyloxy)phenyl]phenyl]-acrylate

NMR (CDCl_3 , δ) : 1.23-2.00 (8H, m), 3.81 (3H, s), 4.01 (2H, t, $J=6.4\text{Hz}$), 4.47 (2H, dt, $J=47.4$ and 6.0Hz), 6.45 (1H, d, $J=16.0\text{Hz}$), 6.96 (2H, d, $J=8.8\text{Hz}$), 7.45-7.63 (6H, m), 7.72 (1H, d, $J=16.0\text{Hz}$)

APCI-MASS : $m/z = 357$ (M^++1)

Preparation 107

Methyl (E)-3-[4-[4-(6-methoxyhexyloxy)phenyl]phenyl]-

- 85 -

acrylate

APCI-MASS : $m/z = 369 (M^+)$ Preparation 108

5 Methyl (E)-3-[4-[4-(8-methoxyoctyloxy)phenyl]phenyl]-
acrylate

IR (KBr) : 2935.1, 2858.0, 1722.1, 1637.3, 1602.6 cm^{-1}

10 NMR (CDCl_3 , δ) : 1.30-1.70 (10H, m), 1.70-1.92 (2H, m), 3.33 (3H, s), 3.37 (2H, t, $J=6.5\text{Hz}$), 3.81 (3H, s), 4.00 (2H, t, $J=6.5\text{Hz}$), 6.45 (1H, d, $J=16.0\text{Hz}$), 6.97 (2H, d, $J=8.8\text{Hz}$), 7.46-7.78 (6H, m), 7.72 (1H, d, $J=16.0\text{Hz}$)

APCI-MASS : $m/z = 397 (M^++1)$

15 Preparation 109

Methyl (E)-3-[4-(4-hydroxyphenyl)phenyl]acrylate

IR (KBr) : 3409.5, 1695.1 cm^{-1}

20 NMR ($\text{DMSO}-d_6$, δ) : 3.73 (3H, s), 6.64 (1H, d, $J=16\text{Hz}$), 6.85 (2H, d, $J=8.6\text{Hz}$), 7.50-7.83 (5H, m)

APCI-MASS : $m/z = 255 (M^++1)$ Preparation 110

25 Methyl (E)-3-[4-[4-(7-methoxyheptyloxy)phenyl]phenyl]-
acrylate

30 NMR (CDCl_3 , δ) : 1.32-1.70 (8H, m), 1.70-1.92 (2H, m), 3.34 (3H, s), 3.38 (2H, t, $J=6.4\text{Hz}$), 3.81 (3H, s), 4.00 (2H, t, $J=6.5\text{Hz}$), 6.45 (1H, d, $J=16.0\text{Hz}$), 6.97 (2H, d, $J=8.8\text{Hz}$), 7.47-7.65 (6H, m), 7.70 (1H, d, $J=16\text{Hz}$)

APCI-MASS : $m/z = 383 (M^++1)$ Preparation 111

35 Methyl (E)-3-[4-[4-(7-fluoroheptyloxy)phenyl]phenyl]-
acrylate

IR (KBr) : 2937.1, 2861.8, 1722.1, 1637.3, 1600.6 cm^{-1}

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The following compound was obtained according to a similar manner to that of Preparation 20.

Preparation 112

5 Methyl 3-[4-(4-heptylphenyl)phenyl]propanoate

NMR (CDCl₃, δ) : 0.88 (3H, t, J=6.5Hz), 1.15-1.50 (8H, m), 1.50-1.77 (2H, m), 2.52-2.73 (4H, m), 2.99 (2H, t, J=7.8Hz), 3.68 (3H, s), 7.18-7.35 (4H, m), 7.40-7.58 (4H, m)

10 APCI-MASS : m/z = 339 (M⁺+1)

The following compounds (Preparation 113 to 164) were obtained according to a similar manner to that of Preparation 32.

15

Preparation 113

4-(4-Octylphenyl)-2,4-dihydro-3H-1,2,4-triazol-3-one-2-yl-acetic acid

IR (KBr) : 2923.6, 1704.8, 1224.6 cm⁻¹

20 NMR (DMSO-d₆, δ) : 0.85 (3H, t, J=6.7Hz), 1.1-1.4 (10H, m), 1.4-1.7 (2H, m), 2.60 (2H, t, J=7.2Hz), 4.38 (2H, s), 7.32 (2H, d, J=8.5Hz), 7.58 (2H, d, J=8.5Hz), 8.43 (1H, s)

25 Preparation 114

1-Heptyl-4-(4-carboxyphenyl)pyrazole

IR (KBr) : 3106, 2917, 1687, 1612, 1425, 1295, 1184, 952, 860, 773 cm⁻¹

30 NMR (DMSO-d₆, δ) : 0.85 (3H, t, J=6.8Hz), 1.1-1.4 (8H, m), 1.7-1.9 (2H, m), 4.11 (2H, t, J=7.0Hz), 7.69 (2H, d, J=8.5Hz), 7.91 (2H, d, J=8.5Hz), 7.98 (1H, s), 8.32 (1H, s), 12.82 (1H, br)

APCI-MASS : m/z = 287 (M+H⁺)

35 Preparation 115

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6-[4-(4-Octyloxyphenyl)piperazin-1-yl]nicotinic acid

IR (KBr pelet) : 2919, 2854, 1697, 1608, 1515, 1429,
1263, 1245, 1228 cm^{-1}

5 NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.7\text{Hz}$), 1.1-1.5 (10H,
m), 1.6-1.8 (2H, m), 3.0-3.2 (4H, m), 3.7-3.9 (4H,
m), 3.88 (2H, t, $J=6.4\text{Hz}$), 6.7-7.0 (5H, m), 7.95
(1H, dd, $J=9.0$ and 1.1Hz), 8.64 (1H, d, $J=1.1\text{Hz}$)

APCI-MASS : $m/z = 412$ ($\text{M}+\text{H}^+$)10 Preparation 116

2-(4-Hexyloxyphenyl)benzoxazole-5-carboxylic acid

IR (KBr) : 2952, 1689, 1677, 1619, 1500, 1415, 1299,
1172, 1024 cm^{-1}

15 NMR (DMSO- d_6 , δ) : 0.89 (3H, t, $J=6.7\text{Hz}$), 1.2-1.5 (6H,
m), 1.7-1.9 (2H, m), 4.09 (2H, t, $J=6.5\text{Hz}$), 7.16
(2H, d, $J=8.8\text{Hz}$), 7.84 (1H, d, $J=8.5\text{Hz}$), 8.01 (1H,
dd, $J=8.5$ and 1.5Hz), 8.15 (2H, d, $J=8.8\text{Hz}$), 8.26
(1H, d, $J=1.5\text{Hz}$)

APCI-MASS : $m/z = 340$ ($\text{M}+\text{H}^+$)

20

Preparation 117

4-[4-(4-n-Butyloxyphenyl)phenyl]benzoic acid

IR (KBr) : 2958, 2873, 1689, 1600, 1537, 1396 cm^{-1} 25 Preparation 118

6-(4-Heptyloxyphenyl)nicotinic acid

IR (KBr) : 2858, 1699, 1674, 1589, 1425, 1180, 1016,
781 cm^{-1}

30 NMR (DMSO- d_6 , δ) : 0.87 (3H, t, $J=6.7\text{Hz}$), 1.2-1.5 (8H,
m), 1.6-1.8 (2H, m), 4.04 (2H, t, $J=6.4\text{Hz}$), 7.06
(2H, d, $J=8.9\text{Hz}$), 8.03 (1H, d, $J=8.2\text{Hz}$), 8.13 (2H,
d, $J=8.9\text{Hz}$), 8.27 (1H, dd, $J=8.2$ and 2.2Hz), 9.09
(1H, d, $J=2.2\text{Hz}$), 13.31 (1H, br)

APCI-MASS : $m/z = 314$ ($\text{M}+\text{H}^+$)

35

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Preparation 119

5-(4-Octyloxyphenyl)isoxazole-3-carboxylic acid

IR (KBr pelet) : 2923, 2852, 1704, 1612, 1440, 1272,
1178 cm^{-1} 5 NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.8\text{Hz}$), 1.2-1.6
(10H, m), 1.6-1.9 (2H, m), 4.03 (2H, t, $J=6.5\text{Hz}$),
7.08 (2H, d, $J=8.9\text{Hz}$), 7.25 (1H, s), 7.86 (2H, d,
 $J=8.9\text{Hz}$)APCI-MASS : $m/z = 318$ ($\text{M}+\text{H}^+$)

10

Preparation 120

2-(2-Octyloxypyridin-5-yl)benzoxazole-5-carboxylic acid

IR (KBr) : 2954, 2923, 2854, 1697, 1683, 1625, 1488,
1290 cm^{-1} 15 NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=7.6\text{Hz}$), 1.2-1.5
(10H, m), 1.7-1.8 (2H, m), 4.36 (2H, t, $J=6.6\text{Hz}$),
7.04 (1H, d, $J=8.7\text{Hz}$), 7.88 (1H, d, $J=8.5\text{Hz}$), 8.04
(1H, dd, $J=8.5$ and 1.6Hz), 8.29 (1H, d, $J=1.6\text{Hz}$),
8.43 (1H, dd, $J=8.7$ and 2.4Hz), 8.99 (1H, d,
20 $J=2.4\text{Hz}$), 13.0-13.2 (1H, br)APCI-MASS : $m/z = 369$ ($\text{M}+\text{H}^+$)Preparation 121

2-[4-(4-Hexylphenyl)phenyl]benzoxazole-5-carboxylic acid

25 IR (KBr) : 2923, 2854, 1683, 1411, 1299, 1054 cm^{-1} APCI-MASS : $m/z = 400$ ($\text{M}+\text{H}^+$)Preparation 122

6-[4-(4-n-Butyloxyphenyl)phenyl]nicotinic acid

30 IR (KBr) : 3406, 2958, 1691, 1591, 1394, 1284,
1253 cm^{-1} NMR (DMSO- d_6 , δ) : 0.94 (3H, t, $J=7.3\text{Hz}$), 1.4-1.8 (4H,
m), 4.01 (2H, t, $J=6.4\text{Hz}$), 7.02 (2H, d, $J=8.7\text{Hz}$),
7.57 (2H, d, $J=8.7\text{Hz}$), 7.61 (2H, d, $J=8.2\text{Hz}$), 7.83
35 (2H, d, $J=8.2\text{Hz}$), 8.05 (1H, d, $J=8.5\text{Hz}$), 8.22 (1H,

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dd, $J=8.5$ and 1.6Hz), 9.14 (1H, d, $J=1.6\text{Hz}$)APCI-MASS : $m/z = 348$ ($M+H^+$)Preparation 123

5 4-[4-(5-Phenoxypropyloxy)phenyl]benzoic acid

NMR (DMSO- d_6 , δ) : $1.5-1.7$ (2H, m), $1.7-1.9$ (4H, m),
 3.98 (2H, t, $J=6.3\text{Hz}$), 4.05 (2H, t, $J=6.1\text{Hz}$), $6.8-$
 7.0 (3H, m), 7.05 (2H, d, $J=8.6\text{Hz}$), 7.25 (2H, t,
 $J=8.2\text{Hz}$), 7.68 (2H, d, $J=8.5\text{Hz}$), 7.75 (2H, d,
10 $J=8.2\text{Hz}$), 7.98 (2H, d, $J=8.2\text{Hz}$), $12.8-13.0$ (1H, br
s)

APCI-MASS : $m/z = 375$ ($M-H$)⁻Preparation 12415 4-[5-(4-n-Hexyloxyphenyl)-1,3,4-oxadiazol-2-yl]benzoic
acidIR (KBr) : 2935 , 2854 , 1685 , 1612 , 1495 , 1425 , 1286 ,
 1251 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.89 (3H, t, $J=6.7\text{Hz}$), $1.2-1.5$ (6H,
20 m), $1.6-1.9$ (3H, m), 4.12 (2H, t, $J=6.4\text{Hz}$), 7.19
(2H, d, $J=8.7\text{Hz}$), 8.08 (2H, d, $J=8.7\text{Hz}$), 8.18 (2H,
d, $J=8.4\text{Hz}$), 8.24 (2H, d, $J=8.4\text{Hz}$)

APCI-MASS : $m/z = 367$ ($M+H$)⁺25 Preparation 1254-[5-(4-n-Hexyloxyphenyl)-1,3,4-thiadiazol-2-yl]benzoic
acidIR (KBr) : 2952 , 2586 , 1699 , 1604 , 1517 , 1432 , 1251 ,
 1174 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.89 (3H, t, $J=6.7\text{Hz}$), $1.3-1.9$ (8H,
30 m), 4.04 (2H, t, $J=6.3\text{Hz}$), 7.13 (2H, d, $J=8.8\text{Hz}$),
 7.97 (2H, d, $J=8.8\text{Hz}$), 8.11 (4H, s)

APCI-MASS : $m/z = 383$ ($M+H$)⁺35 Preparation 126

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5-(4-Octyloxyphenyl)-1-methylpyrazole-3-carboxylic acid

IR (KBr pelet) : 2950, 2923, 1695, 1450, 1282, 1251,
956 cm^{-1} NMR (DMSO-d_6 , δ) : 0.86 (3H, t, $J=6.8\text{Hz}$), 1.2-1.5
(10H, m), 1.6-1.8 (2H, m), 3.98 (2H, t, $J=6.5\text{Hz}$),
4.10 (3H, s), 6.95 (1H, d, $J=8.8\text{Hz}$), 7.18 (1H, s),
7.73 (2H, d, $J=8.8\text{Hz}$), 13.37 (1H, br)APCI-MASS : $m/z = 331$ ($\text{M}+\text{H}^+$)10 Preparation 127

4-[3-(4-n-Pentyloxyphenyl)pyrazol-5-yl]benzoic acid

IR (KBr) : 3224, 2956, 1692, 1614, 1506, 1251 cm^{-1} NMR (DMSO-d_6 , δ) : 0.91 (3H, t, $J=6.9\text{Hz}$), 1.3-1.5 (4H,
m), 1.6-1.8 (2H, m), 4.00 (2H, t, $J=6.5\text{Hz}$), 7.02
(2H, d, $J=8.8\text{Hz}$), 7.19 (1H, s), 7.75 (2H, d,
 $J=8.8\text{Hz}$), 7.95 (2H, d, $J=8.7\text{Hz}$), 8.02 (2H, d,
 $J=8.7\text{Hz}$), 12.8-13.3 (2H, br)APCI-MASS : $m/z = 351$ ($\text{M}+\text{H}^+$)20 Preparation 128

5-[4-(4-n-Butoxyphenyl)phenyl]furan-2-carboxylic acid

IR (KBr) : 2958, 2873, 1679, 1487, 1253, 1166 cm^{-1} NMR (DMSO-d_6 , δ) : 0.95 (3H, t, $J=7.3\text{Hz}$), 1.3-1.8 (4H,
m), 4.02 (2H, t, $J=6.3\text{Hz}$), 7.03 (2H, d, $J=8.6\text{Hz}$),
7.17 (1H, d, $J=3.6\text{Hz}$), 7.33 (1H, d, $J=3.6\text{Hz}$), 7.66
(2H, d, $J=8.6\text{Hz}$), 7.74 (2H, d, $J=8.4\text{Hz}$), 7.86 (2H,
d, $J=8.4\text{Hz}$), 13.1 (1H, br s)APCI-MASS : $m/z = 337$ ($\text{M}+\text{H}^+$)30 Preparation 129

3-(S)-Hydroxyhexadecanoic acid

IR (KBr) : 1679.7, 1467.6, 1224.6 cm^{-1} NMR (CDCl_3 , δ) : 0.88 (3H, t, $J=6.4\text{Hz}$), 1.1-1.7 (24H,
m), 2.35-2.65 (2H, m), 4.03 (1H, m), 5.41 (1H, br
s)

Preparation 130

6-[4-(4-n-Hexyloxyphenyl)piperazin-1-yl]pyridazine-3-carboxylic acid

IR (KBr) : 1697.1, 1589.1, 1515.8, 1448.3 cm^{-1}

5 NMR (DMSO- d_6 , δ) : 0.87 (3H, t, $J=6.4\text{Hz}$), 1.2-1.5 (6H, m), 1.6-1.8 (2H, m), 3.0-3.2 (4H, m), 3.7-4.0 (6H, m), 6.83 (2H, d, $J=9.0\text{Hz}$), 6.95 (2H, d, $J=9.0\text{Hz}$), 7.36 (1H, d, $J=9.6\text{Hz}$), 7.86 (1H, d, $J=9.6\text{Hz}$), 11.68 (1H, s)

10

Preparation 131

4-[4-[1-(4-n-Hexyloxyphenyl)piperidin-4-yl]piperazin-1-yl]benzoic acid hydrochloride

IR (KBr) : 1699.0, 1608.3, 1513.8 cm^{-1}

15 NMR (DMSO- d_6 , δ) : 0.88 (3H, t, $J=6.5\text{Hz}$), 1.2-1.5 (6H, m), 1.6-1.8 (2H, m), 2.0-2.45 (3H, m), 3.2-3.8 (12H, m), 3.94 (2H, t, $J=6.4\text{Hz}$), 4.03 (2H, d, $J=11\text{Hz}$), 6.95 (2H, d, $J=8.7\text{Hz}$), 7.07 (2H, d, $J=8.9\text{Hz}$), 7.32 (2H, br s), 7.83 (2H, d, $J=8.9\text{Hz}$)

20 APCI-MASS : $m/z = 466 (M^+ + H)$

Preparation 132

6-(8-Methoxyoctyloxy)-2-naphthoic acid

IR (KBr) : 2937.1, 2854.1, 1677.8, 1211.1 cm^{-1}

25 NMR (DMSO- d_6 , δ) : 1.2-1.6 (10H, m), 1.7-1.9 (2H, m), 3.20 (3H, s), 3.29 (2H, t, $J=6.5\text{Hz}$), 4.11 (2H, t, $J=6.4\text{Hz}$), 7.23 (1H, dd, $J=9.0$ and 2.3Hz), 7.39 (1H, d, $J=2.3\text{Hz}$), 7.85 (1H, d, $J=8.7\text{Hz}$), 7.93 (1H, d, $J=8.7\text{Hz}$), 7.99 (1H, d, $J=9.0\text{Hz}$), 8.51 (1H, s), 12.9 (1H, s)

30

Preparation 133

Mixture of (E) and (Z)-3-[4-(4-Heptylphenyl)phenyl]-2-butenic acid

35 NMR (CDCl_3 , δ) : 0.88 (3H, t, $J=6.6\text{Hz}$), 1.15-1.50 (8H,

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m), 1.52-1.75 (2H, m), 2.63 and 3.62 (total 3H, each s), 2.53-2.75 (2H, m), 6.24 and 5.68 (total 1H, each s), 7.19-7.35 (2H, m), 7.47-7.70 (6H, m)
APCI-MASS : m/z = 337 ($M^+ + 1$), 351 (methyl ester $^+ + 1$)

5

Preparation 134

3-[4-(4-Heptylphenyl)phenyl]propanoic acid

NMR ($CDCl_3$, δ) : 0.88 (3H, t, $J=6.6$ Hz), 1.13-1.48 (8H, m), 1.48-1.75 (2H, m), 2.52-2.83 (4H, m), 3.00 (2H, t, $J=7.8$ Hz), 7.15-7.35 (4H, m), 7.40-7.60 (4H, m)
APCI-MASS : m/z = 323 ($M^+ - 1$)

10

Preparation 135

4-(4-n-Heptylphenyl)benzoyl-carboxylic acid

NMR ($CDCl_3$, δ) : 0.88 (3H, t, $J=6.6$ Hz), 1.13-1.50 (8H, m), 1.50-1.75 (2H, m), 2.66 (2H, t, $J=7.7$ Hz), 7.20-7.40 (2H, m), 7.50-7.66 (2H, m), 7.66-7.84 (2H, m), 8.40-8.60 (2H, m)
APCI-MASS : m/z = 323 ($M^+ - 1$)

20

Preparation 136

6-Hexylnaphthalene-2-carboxylic acid

NMR ($CDCl_3$, δ) : 0.89 (3H, t, $J=6.8$ Hz), 1.15-1.53 (6H, m), 1.55-1.84 (2H, m), 2.80 (2H, t, $J=7.6$ Hz), 7.42 (1H, dd, $J=1.7$ and 8.4Hz), 7.67 (1H, s), 7.84 (1H, d, $J=8.6$ Hz), 7.90 (1H, d, $J=8.4$ Hz), 8.09 (1H, dd, $J=1.7$ and 8.6Hz), 8.68 (1H, s)
APCI-MASS : m/z = 257 ($M^+ + 1$), 271 (methyl ester $^+ + 1$)

25

30 Preparation 137

3-(E)-[4-[4-(7-Methoxyheptyloxy)phenyl]phenyl]acrylic acid

NMR ($DMSO-d_6$, δ) : 1.20-1.60 (8H, m), 1.60-1.83 (2H, m), 3.21 (3H, s), 3.25-3.60 (2H, m), 4.01 (2H, t, $J=6.4$ Hz), 6.54 (1H, d, $J=16.0$ Hz), 7.02 (2H, d,

35

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 $J=8.8\text{Hz}$), 7.55-7.80 (7H, m)APCI-MASS : $m/z = 369 (M^++1)$ Preparation 138

5 3-(E)-[4-[4-(8-Methoxyoctyloxy)phenyl]phenyl]acrylic
acid

IR (KBr) : 3037.3, 2933.2, 2858.0, 2551.4, 1706.7,
1677.8, 1629.6, 1602.6 cm^{-1}

10 NMR (DMSO- d_6 , δ) : 1.18-1.55 (10H, m), 1.65-1.83 (2H,
m), 3.18-3.45 (5H, m), 4.01 (2H, t, $J=6.5\text{Hz}$), 6.53
(1H, d, $J=16.0\text{Hz}$), 7.02 (2H, d, $J=8.8\text{Hz}$), 7.50-8.80
(7H, m)

APCI-MASS : $m/z = 383 (M^++1)$

15 Preparation 139

3-(E)-[4-[4-(5-Hexenyloxy)phenyl]phenyl]acrylic acid

20 NMR (DMSO- d_6 , δ) : 1.42-1.63 (2H, m), 1.63-1.85 (2H,
m), 2.00-2.20 (2H, m), 4.03 (2H, t, $J=6.3\text{Hz}$), 4.90-
5.15 (2H, m), 5.68-5.97 (1H, m), 6.54 (1H, d,
 $J=16\text{Hz}$), 7.02 (2H, d, $J=8.7\text{Hz}$), 7.50-7.80 (7H, m)

APCI-MASS : $m/z = 323 (M^++1)$ Preparation 140

25 3-(E)-[4-[4-(4-Methylpentyloxy)phenyl]phenyl]acrylic
acid

IR (KBr) : 2956.3, 2869.6, 2713.4, 2599.6, 1689.3,
1627.6, 1602.6 cm^{-1}

30 NMR (DMSO- d_6 , δ) : 0.89 (6H, d, $J=6.5\text{Hz}$), 1.15-1.43
(2H, m), 1.48-1.90 (3H, m), 4.00 (2H, t, $J=6.7\text{Hz}$),
6.54 (1H, d, $J=16\text{Hz}$), 7.02 (2H, d, $J=8.7\text{Hz}$), 7.50-
7.90 (7H, m)

APCI-MASS : $m/z = 325 (M^++1)$ Preparation 141

35 3-(E)-[4-[4-(6-Fluorohexyloxy)phenyl]phenyl]acrylic acid

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NMR (CDCl₃, δ) : 1.39-2.00 (8H, m), 4.01 (2H, t, J=6.5Hz), 4.47 (2H, dt, J=47.3 and 6.0Hz), 6.49 (1H, d, J=15.9Hz), 6.98 (2H, d, J=8.7Hz), 7.40-7.70 (6H, m), 7.81 (1H, d, J=15.9Hz)

5 APCI-MASS : m/z = 343 (M⁺+1)

Preparation 142

3-(E)-[4-[4-(6-Methoxyhexyloxy)phenyl]phenyl]acrylic acid

10 NMR (DMSO-d₆, δ) : 1.22-1.63 (6H, m), 1.63-1.88 (2H, m), 3.21 (3H, s), 3.22-3.40 (2H, m), 4.00 (2H, t, J=6.5Hz), 6.54 (1H, d, J=15.8Hz), 7.02 (2H, d, J=8.7Hz), 7.50-7.84 (7H, m)

APCI-MASS : m/z = 369 (methyl ester, M⁺+1)

15

Preparation 143

4-[4-[8-(Tetrahydropyran-2-yl-oxy)octyloxy]phenyl]benzoic acid

20 IR (KBr) : 2935, 1697, 1683, 1604, 1303, 1290, 1197 cm⁻¹

NMR (DMSO-d₆, δ) : 1.2-1.8 (18H, m), 3.3-3.9 (4H, m), 4.01 (2H, t, J=6.3Hz), 4.5-4.6 (1H, m), 7.03 (2H, d, J=8.7Hz), 7.67 (2H, d, J=8.7Hz), 7.74 (2H, d, J=8.3Hz), 7.98 (2H, d, J=8.3Hz)

25 APCI-MASS : m/z = 425 (M-H⁺)

Preparation 144

4-[3-(4-n-Hexyloxyphenyl)pyrazol-5-yl]benzoic acid

30 IR (KBr) : 2956, 2935, 1693, 1614, 1508, 1432, 1251, 1178 cm⁻¹

35 NMR (DMSO-d₆, δ) : 0.89 (3H, t, J=6.4Hz), 1.2-1.5 (6H, m), 1.6-1.8 (2H, m), 4.00 (2H, t, J=6.4Hz), 7.02 (2H, d, J=8.7Hz), 7.12 (1H, s), 7.74 (2H, d, J=8.7Hz), 7.95 (2H, d, J=8.8Hz), 8.01 (2H, d, J=8.8Hz), 13.17 (1H, s)

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APCI-MASS : $m/z = 365$ ($M+H^+$)Preparation 145

4-[4-[4-(6-Methoxyhexyloxy)phenyl]phenyl]benzoic acid

5 IR (KBr) : 2939, 2861, 1685, 1602, 1430, 1286,
1128 cm^{-1}

NMR ($\text{DMSO}-d_6$, δ) : 1.3-1.8 (8H, m), 3.21 (3H, s),
3.3-3.4 (2H, m), 4.01 (2H, t, $J=6.5\text{Hz}$), 7.04 (2H,
10 d, $J=8.6\text{Hz}$), 7.66 (2H, d, $J=8.6\text{Hz}$), 7.7-7.9 (6H,
m), 8.03 (2H, d, $J=8.2\text{Hz}$)

APCI-MASS : $m/z = 405$ ($M+H^+$)Preparation 146

15 4-[5-[4-(8-Methoxyoctyloxy)phenyl]-1,3,4-thiadiazol-2-
yl]benzoic acid

IR (KBr) : 2931, 2854, 1691, 1602, 1251 cm^{-1}

NMR ($\text{DMSO}-d_6$, δ) : 1.2-2.0 (12H, m), 3.20 (3H, s),
3.29 (2H, t, $J=6.4\text{Hz}$), 4.04 (2H, t, $J=6.4\text{Hz}$), 7.13
(2H, t, $J=8.8\text{Hz}$), 7.9-8.2 (6H, m), 13.95 (1H, br)

20 APCI-MASS : $m/z = 441$ ($M+H^+$)

Preparation 147

4-(4-n-Butoxyphenyl)cinnamic acid

IR (KBr) : 2958, 2871, 1695, 1625, 1498, 1249 cm^{-1}

25 NMR ($\text{DMSO}-d_6$, δ) : 0.94 (3H, t, $J=7.3\text{Hz}$), 1.44 (2H,
tq, $J=7.0$ and 7.3Hz), 1.71 (2H, tt, $J=7.0$ and
6.4Hz), 4.01 (2H, t, $J=6.4\text{Hz}$), 6.54 (1H, d,
 $J=16.0\text{Hz}$), 7.02 (2H, d, $J=8.7\text{Hz}$), 7.6-7.9 (7H, m)

APCI-MASS : $m/z = 297$ ($M+H^+$)

30

Preparation 148

4-[5-(4-Cyclohexylphenyl)-1,3,4-thiadiazol-2-yl]benzoic
acid

IR (KBr) : 2925, 2850, 1683, 1429, 1292 cm^{-1}

35 NMR ($\text{DMSO}-d_6$, δ) : 1.1-1.5 (5H, m), 1.6-2.0 (5H, m),

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2.4-2.6 (1H, m), 7.45 (2H, d, J=8.3Hz), 7.96 (2H, d, J=8.3Hz), 8.13 (4H, s)

APCI-MASS : m/z = 365 (M+H)⁺

5 Preparation 149

4-[5-[4-(Piperidin-1-yl)phenyl]-1,3,4-thiadiazol-2-yl]-benzoic acid

IR (KBr) : 2931, 2854, 1685, 1604, 1415, 1238 cm⁻¹

10 NMR (DMSO-d₆, δ) : 1.61 (6H, s), 3.31 (4H, s), 7.05 (2H, d, J=9.0Hz), 7.83 (2H, d, J=9.0Hz), 8.10 (4H, s)

APCI-MASS : m/z = 366 (M+H)⁺

Preparation 150

15 4-[5-[4-[4-n-Propyloxyphenyl]phenyl]-1,3,4-oxadiazol-2-yl]benzoic acid

IR (KBr) : 2939, 1689, 1606, 1488, 1429, 1290 cm⁻¹

20 NMR (DMSO-d₆, δ) : 1.00 (3H, t, J=7.3Hz), 1.76 (2H, tq, J=6.5 and 7.3Hz), 4.00 (2H, t, J=6.5Hz), 7.07 (2H, d, J=8.8Hz), 7.70 (2H, d, J=8.5Hz), 7.78 (2H, d, J=8.8Hz), 7.90 (2H, d, J=8.5Hz), 8.0-8.4 (4H, m)

APCI-MASS : m/z = 401 (M+H)⁺

Preparation 151

25 4-(5-n-Nonyl-1,3,4-oxadiazol-2-yl)benzoic acid

IR (KBr) : 2919, 2852, 1685, 1565, 1430, 1284 cm⁻¹

NMR (DMSO-d₆, δ) : 0.84 (3H, t, J=6.5Hz), 1.2-1.5 (12H, m), 1.7-1.9 (2H, m), 2.94 (2H, t, J=7.4Hz), 8.0-8.2 (4H, m), 13.35 (1H, s)

30 APCI-MASS : m/z = 317 (M+H)⁺

Preparation 152

4-[3-(4-n-Hexyloxyphenyl)-1,2,4-oxadiazol-5-yl]benzoic acid

35 IR (KBr) : 2942, 2869, 1695, 1421, 1251 cm⁻¹

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NMR (DMSO-d₆, δ) : 0.89 (3H, t, J=6.8Hz), 1.2-1.8 (8H, m), 4.06 (2H, t, J=6.5Hz), 7.13 (2H, d, J=8.9Hz), 8.03 (2H, d, J=8.9Hz), 8.17 (2H, d, J=8.5Hz), 8.28 (2H, d, J=8.5Hz)

5 APCI-MASS : m/z = 367 (M+H)⁺

Preparation 153

4-[4-[4-(5-Methoxypentyloxy)phenyl]phenyl]phenylacetic acid

10 IR (KBr) : 2939, 2861, 1699, 1253, 1182, 1124 cm⁻¹

NMR (DMSO-d₆, δ) : 1.4-1.9 (6H, m), 3.22 (3H, s), 3.39 (2H, t, J=6.2Hz), 3.61 (2H, s), 4.01 (2H, t, J=6.4Hz), 7.02 (2H, d, J=8.8Hz), 7.35 (2H, d, J=8.2Hz), 7.6-7.8 (8H, m)

15 APCI-MASS : m/z = 405 (M+H⁺)

Preparation 154

4-[5-(4-n-Octyloxyphenyl)-1,3,4-thiadiazol-2-yl]benzoic acid

20 IR (KBr) : 2921, 2856, 1691, 1432, 1251 cm⁻¹

NMR (DMSO-d₆, δ) : 0.87 (3H, t, J=6.7Hz), 1.2-1.5 (10H, m), 1.7-1.9 (2H, m), 4.07 (2H, t, J=6.5Hz), 7.13 (2H, d, J=8.9Hz), 7.97 (2H, d, J=8.9Hz), 8.12 (4H, s)

25 APCI-MASS : m/z = 411 (M+H⁺)

Preparation 155

4-[5-(4-Trans-n-pentylcyclohexyl)-1,3,4-thiadiazol-2-yl]benzoic acid

30 IR (KBr) : 2919, 2848, 1677, 1430, 1294 cm⁻¹

NMR (DMSO-d₆, δ) : 0.87 (3H, t, J=6.9Hz), 1.0-1.4 (11H, m), 1.5-1.6 (2H, m), 1.8-2.0 (2H, m), 2.1-2.3 (2H, m), 3.1-3.3 (1H, m), 8.07 (4H, s)

APCI-MASS : m/z = 359 (M+H⁺)

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Preparation 156

4-[3-(4-n-Pentyloxyphenyl)isoxazol-5-yl]benzoic acid

IR (KBr) : 2925, 2869, 1699, 1687, 1612, 1432, 1251,
1178 cm^{-1}

5 NMR (DMSO- d_6 , δ) : 0.91 (3H, t, $J=6.9\text{Hz}$), 1.2-1.5 (4H, m), 1.7-1.9 (2H, m), 4.04 (2H, t, $J=6.5\text{Hz}$), 7.09 (2H, d, $J=8.8\text{Hz}$), 7.69 (1H, s), 7.85 (2H, d, $J=8.8\text{Hz}$), 8.01 (2H, d, $J=8.5\text{Hz}$), 8.11 (2H, d, $J=8.5\text{Hz}$)

10 APCI-MASS : $m/z = 352$ ($\text{M}+\text{H}^+$)

Preparation 157

4-[5-[4-(8-Methoxyoctyloxy)phenyl]-1,3,4-oxadiazol-2-yl]benzoic acid

15 IR (KBr) : 2967, 2937, 2877, 1687, 1290 cm^{-1}

NMR (DMSO- d_6 , δ) : 1.2-1.6 (10H, m), 1.7-1.9 (2H, m), 3.20 (3H, s), 3.29 (2H, t, $J=6.4\text{Hz}$), 4.08 (2H, t, $J=6.5\text{Hz}$), 7.17 (2H, d, $J=8.9\text{Hz}$), 8.07 (2H, d, $J=8.9\text{Hz}$), 8.15 (2H, d, $J=8.6\text{Hz}$), 8.24 (2H, d, $J=8.6\text{Hz}$)

20 APCI-MASS : $m/z = 425$ ($\text{M}+\text{H}^+$)

Preparation 158

4-[4-(6-Phenylpyridazin-3-yl-oxy)phenyl]benzoic acid

25 IR (KBr) : 1700, 1687, 1608, 1427, 1284, 1186 cm^{-1}

NMR (DMSO- d_6 , δ) : 7.40 (2H, d, $J=8.6\text{Hz}$), 7.5-7.7 (4H, m), 7.7-7.9 (4H, m), 7.9-8.1 (4H, m), 8.35 (1H, d, $J=9.2\text{Hz}$), 12.99 (1H, br s)

30 APCI-MASS : $m/z = 369$ ($\text{M}+\text{H}^+$)

Preparation 159

4-[5-(4-n-Octyloxyphenyl)-1,3,4-oxadiazol-2-yl]benzoic acid

35 IR (KBr) : 2921, 2852, 1685, 1612, 1496, 1425, 1288,
1251 cm^{-1}

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NMR (DMSO- d_6 , δ) : 0.87 (3H, t, $J=6.7\text{Hz}$), 1.2-1.5
(10H, m), 1.7-1.9 (2H, m), 4.08 (2H, t, $J=6.4\text{Hz}$),
7.17 (2H, d, $J=8.7\text{Hz}$), 8.07 (2H, d, $J=8.7\text{Hz}$), 8.15
(2H, d, $J=8.5\text{Hz}$), 8.24 (2H, d, $J=8.5\text{Hz}$), 13.36 (1H,
br)

APCI-MASS : $m/z = 395$ ($M+H^+$)

Preparation 160

4-[2-(4-n-Hexyloxyphenyl)pyrimidin-6-yl]benzoic acid

IR (KBr) : 2944, 2863, 1697, 1585, 1415, 1386,
1253 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.89 (3H, t, $J=6.7\text{Hz}$), 1.2-1.6 (6H,
m), 1.7-1.9 (2H, m), 4.07 (2H, t, $J=6.6\text{Hz}$), 7.10
(2H, d, $J=8.9\text{Hz}$), 8.00 (1H, d, $J=5.2\text{Hz}$), 8.13 (2H,
d, $J=8.4\text{Hz}$), 8.44 (2H, d, $J=5.9\text{Hz}$), 8.47 (2H, d,
 $J=5.9\text{Hz}$), 8.95 (1H, d, $J=5.2\text{Hz}$)

APCI-MASS : $m/z = 377$ ($M+H^+$)

Preparation 161

4-[4-(7-Piperidinocarbonylheptyloxy)phenyl]benzoic acid

IR (KBr) : 2933, 2858, 1697, 1677, 1637, 1604, 1429,
1249 cm^{-1}

NMR (DMSO- d_6 , δ) : 1.2-1.8 (16H, m), 2.26 (2H, t,
 $J=7.5\text{Hz}$), 3.2-3.5 (4H, m), 4.01 (2H, t, $J=6.4\text{Hz}$),
7.03 (2H, d, $J=8.8\text{Hz}$), 7.67 (2H, d, $J=8.8\text{Hz}$), 7.74
(2H, d, $J=8.4\text{Hz}$), 7.98 (2H, d, $J=8.4\text{Hz}$)

APCI-MASS : $m/z = 424$ ($M+H^+$)

Preparation 162

6-[4-(4-n-Heptyloxyphenyl)piperazin-1-yl]nicotinic acid

IR (KBr) : 2929, 2854, 1695, 1673, 1606, 1577, 1515,
1421, 1245 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.7\text{Hz}$), 1.2-1.5 (8H,
m), 1.6-1.8 (2H, m), 3.0-3.2 (4H, m), 3.6-3.8 (4H,
m), 3.87 (2H, t, $J=6.5\text{Hz}$), 6.8-7.2 (5H, m), 7.95

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(1H, dd, J=8.9 and 2.3Hz), 8.62 (1H, d, J=2.3Hz)

APCI-MASS : m/z = 398 (M+H⁺)Preparation 163

5 6-[4-[4-(8-Methoxyoctyloxy)phenyl]piperazin-1-yl]-
nicotinic acid

IR (KBr) : 2933, 2856, 1697, 1672, 1605, 1511, 1421,
1245 cm⁻¹

10 NMR (DMSO-d₆, δ) : 1.2-1.8 (12H, m), 3.08 (4H, t,
J=5.0Hz), 3.20 (3H, s), 3.28 (2H, t, J=6.5Hz), 3.78
(4H, t, J=4.6Hz), 3.87 (2H, t, J=6.4Hz), 6.8-7.0
(5H, m), 7.95 (1H, dd, J=9.0 and 2.2Hz), 8.65 (1H,
d, J=2.2Hz), 12.54 (1H, s)

APCI-MASS : m/z = 442 (M+H⁺)

15

Preparation 164

4-[5-[4-(4-n-Propyloxyphenyl)phenyl]-1,3,4-thiadiazol-2-
yl]benzoic acid

IR (KBr) : 1685, 1537, 1423, 817 cm⁻¹

20 NMR (DMSO-d₆, δ) : 1.00 (3H, t, J=6.7Hz), 1.6-1.8 (2H,
m), 4.00 (2H, t, J=6.6Hz), 7.0-7.2 (2H, d,
J=8.6Hz), 7.6-8.1 (10H, m)

APCI-MASS : m/z = 417 (M+H)⁺

25 Preparation 165

To a solution of Ethyl 4-[5-(4-n-pentyloxyphenyl)-
isoxazol-3-yl]benzoate (6.33 g) in ethanol (60 ml) and
tetrahydrofuran (90 ml) was added 2N sodium hydroxide aqueous
solution (12.5 ml) at 80°C. The mixture was refluxed for 1
30 hour and poured into ice-water. The suspension was adjusted
to pH 2.0 with 1N HCl. The precipitate was collected by
filtration, washed with water and dried to give 4-[5-(4-n-
pentyloxyphenyl)isoxazol-3-yl]benzoic acid (5.80 g).

35 IR (KBr) : 2939, 2867, 1681, 1614, 1429, 1255, 1178,
821 cm⁻¹

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NMR (DMSO- d_6 , δ) : 0.91 (3H, t, $J=7.1\text{Hz}$), 1.3-1.5 (4H, m), 1.6-1.8 (2H, m), 4.04 (2H, t, $J=6.5\text{Hz}$), 7.11 (2H, d, $J=8.9\text{Hz}$), 7.54 (1H, s), 7.85 (2H, d, $J=8.9\text{Hz}$), 7.98 (2H, d, $J=8.6\text{Hz}$), 8.11 (2H, d, $J=8.6\text{Hz}$)

APCI-MASS : $m/z = 352 (M+H)^+$

The following compounds (Preparations 166 to 170) were obtained according to a similar manner to that of Preparation 40.

Preparation 166

5-[4-(4-n-Hexyloxyphenyl)piperazin-1-yl]picolic acid trihydrochloride

IR (KBr) : 1689.3, 1577.5, 1511.9, 1241.9 cm^{-1}
NMR (DMSO- d_6 , δ) : 0.88 (3H, t, $J=6.5\text{Hz}$), 1.15-1.5 (6H, m), 1.6-1.8 (2H, m), 3.1-3.25 (4H, m), 3.45-3.6 (4H, m), 3.89 (2H, t, $J=6.4\text{Hz}$), 6.84 (2H, d, $J=9.1\text{Hz}$), 6.97 (2H, d, $J=9.1\text{Hz}$), 7.43 (1H, dd, $J=8.8$ and 3.0Hz), 7.90 (1H, dd, $J=8.8$ and 0.7Hz), 8.41 (1H, dd, $J=3.0$ and 0.7Hz)
APCI-MASS : $m/z = 384 (M^++H)$

Preparation 167

4-[4-(4-Phenylcyclohexyl)piperazin-1-yl]benzoic acid dihydrochloride

IR (KBr) : 1700.9, 1606.4, 1220.7, 1180.2 cm^{-1}
NMR (DMSO- d_6 , δ) : 1.4-1.85 (4H, m), 1.9-2.05 (2H, m), 2.2-2.4 (2H, m), 3.1-3.5 (6H, m), 3.5-3.7 (2H, m), 3.9-4.2 (2H, m), 7.06 (2H, d, $J=8.8\text{Hz}$), 7.1-7.4 (5H, m), 7.83 (2H, d, $J=8.8\text{Hz}$)
APCI-MASS : $m/z = 365 (M^++H)$

Preparation 168

4-(4-Trans-n-pentylcyclohexyl)benzoic acid

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IR (KBr) : 1681.6, 1423.2, 1290.1 cm^{-1} NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.6\text{Hz}$), 1.0-1.6 (13H, m), 1.89 (4H, d, $J=10\text{Hz}$), 2.54 (1H, t, $J=12\text{Hz}$), 7.30 (2H, d, $J=8.3\text{Hz}$), 8.03 (2H, d, $J=8.3\text{Hz}$)5 APCI-MASS : $m/z = 274$ ($\text{M}^+ + \text{H}$)Preparation 169

4-(4-Piperidinopiperidin-1-yl)benzoic acid

IR (KBr) : 1710.6, 1403.9 cm^{-1} 10 NMR ($\text{DMSO}-d_6$, δ) : 1.6-2.1 (8H, m), 2.17 (2H, d, $J=12\text{Hz}$), 2.7-3.05 (4H, m), 3.2-3.5 (1H, m), 3.35 (2H, d, $J=12\text{Hz}$), 4.05 (2H, d, $J=13\text{Hz}$), 7.01 (2H, d, $J=8.9\text{Hz}$), 7.77 (2H, d, $J=8.9\text{Hz}$), 10.84 (1H, s)APCI-MASS : $m/z = 289$ ($\text{M}^+ + \text{H}$)

15

Preparation 170

3-Chloro-4-[4-(4-n-hexyloxyphenyl)piperazin-1-yl]benzoic acid dihydrochloride

IR (KBr) : 1712.5, 1598.7, 1513.8, 1251.6 cm^{-1} 20 NMR ($\text{DMSO}-d_6$, δ) : 0.88 (3H, t, $J=6.6\text{Hz}$), 1.2-1.5 (6H, m), 1.6-1.8 (2H, m), 3.4-3.6 (8H, m), 3.98 (2H, t, $J=6.4\text{Hz}$), 7.02 (2H, d, $J=9.0\text{Hz}$), 7.32 (1H, d, $J=8.1\text{Hz}$), 7.60 (2H, d, $J=9.0\text{Hz}$), 7.89 (1H, d, $J=8.1\text{Hz}$), 8.02 (1H, s)25 APCI-MASS : $m/z = 417$ ($\text{M}^+ + \text{H}$)The following compounds (Preparations 171 to 175) were obtained according to a similar manner to that of Preparation 41.

30

Preparation 171

Ethyl [4-(4-octylphenyl)-2,3-dihydro-4H-1,2,4-triazole-3-one-2-yl]acetate

35 IR (KBr) : 2921.6, 1764.5, 1715, 1197.6 cm^{-1}

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NMR (CDCl₃, δ) : 0.88 (3H, t, J=6.7Hz), 1.30 (3H, t, J=7.1Hz), 1.2-1.4 (10H, m), 1.5-1.7 (2H, m), 2.63 (2H, t, J=7.9Hz), 4.26 (2H, q, J=7.1Hz), 4.64 (2H, s), 7.28 (2H, d, J=8.4Hz), 7.44 (2H, d, J=8.4Hz), 7.71 (1H, s)

Preparation 172

4-[4-(4-tert-Butoxycarbonylpiperazin-1-yl)phenyl]-2-(4-methylpentyl)-2,3-dihydro-4H-1,2,4-triazol-3-one

10 IR (KBr) : 1687.4 cm⁻¹

NMR (CDCl₃, δ) : 0.90 (6H, d, J=6.5Hz), 1.1-1.4 (2H, m), 1.49 (9H, s), 1.4-1.9 (3H, m), 3.16 (4H, t, J=4.9Hz), 3.59 (4H, t, J=4.9Hz), 3.82 (2H, t, J=7.3Hz), 6.98 (2H, d, J=9.0Hz), 7.41 (2H, d, J=9.0Hz), 7.61 (1H, s)

Preparation 173

Methyl 6-(8-bromooctyloxy)-2-naphthoate

IR (KBr) : 2933.2, 2856.1, 1720.2, 1294, 1209.1 cm⁻¹

20 NMR (CDCl₃, δ) : 1.3-1.6 (8H, m), 1.75-2.0 (4H, m), 3.42 (2H, t, J=6.8Hz), 3.96 (3H, s), 4.09 (2H, t, J=6.5Hz), 7.14 (1H, d, J=1.7Hz), 7.19 (1H, dd, J=8.9 and 1.7Hz), 7.73 (1H, d, J=8.7Hz), 7.83 (1H, d, J=8.9Hz), 8.01 (1H, dd, J=8.7 and 1.7Hz), 8.51 (1H, d, J=1.7Hz)

25 APCI-MASS : m/z = 393 (M⁺+H)

Preparation 174

4-[4-(6-n-Propyloxyhexyloxy)phenyl]benzoic acid

30 IR (KBr) : 2937, 2858, 1695, 1683, 1604, 1430, 1290, 1247, 1195 cm⁻¹

NMR (DMSO-d₆, δ) : 0.85 (3H, t, J=7.4Hz), 1.3-1.9 (10H, m), 3.2-3.4 (4H, m), 4.01 (2H, t, J=6.3Hz), 7.04 (2H, d, J=8.7Hz), 7.67 (2H, d, J=8.7Hz), 7.74 (2H, d, J=8.3Hz), 7.98 (2H, d, J=8.3Hz), 12.9 (1H,

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s)

APCI-MASS : $m/z = 357$ ($M+H^+$)Preparation 175

5 4-[4-(6-Bromohexyloxy)phenyl]bromobenzene

NMR ($CDCl_3$, δ) : 1.40-1.65 (4H, m), 1.70-2.00 (4H, m),
3.43 (2H, t, $J=6.7$ Hz), 4.00 (2H, t, $J=6.4$ Hz), 6.95
(2H, d, $J=8.8$ Hz), 7.30-7.60 (6H, m)

10 The following compounds (Preparations 176 to 180) were
obtained according to a similar manner to that of Preparation
43.

Preparation 17615 4-[4-(4-n-Pentyloxyphenyl)piperazin-1-yl]benzoic acid
dihydrochlorideIR (KBr) : 1668.1, 1602.6, 1510.0, 1228.4 cm^{-1}

20 NMR ($DMSO-d_6$, δ) : 0.89 (3H, t, $J=6.9$ Hz), 1.2-1.5 (5H,
m), 1.6-1.9 (2H, m), 3.0-3.2 (4H, m), 3.4-3.6 (4H,
m), 3.88 (2H, t, $J=6.4$ Hz), 6.83 (2H, d, $J=9$ Hz),
6.9-7.1 (4H, m), 7.79 (2H, d, $J=8.8$ Hz), 12.32 (1H,
s)

APCI-MASS : $m/z = 369$ ($M+H^+$)25 Preparation 1774-[4-(4-n-Heptyloxyphenyl)piperazin-1-yl]benzoic acid
dihydrochlorideIR (KBr) : 1666.2, 1600.6, 1511.9 cm^{-1}

30 NMR ($CDCl_3$, δ) : 0.89 (3H, t, $J=6.9$ Hz), 1.2-2.0 (10H,
m), 3.1-3.3 (4H, m), 3.4-3.6 (4H, m), 3.92 (2H, t,
 $J=6.4$ Hz), 6.8-7.1 (6H, m), 8.00 (2H, d, $J=8.8$ Hz)

Preparation 178

35 4-[4-[4-(4-Methylpentyloxy)phenyl]piperazin-1-yl]benzoic

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acid dihydrochloride

IR (KBr) : 1668.1, 1602.6, 1510.0, 1236.1 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.89 (6H, d, $J=6.5\text{Hz}$), 1.2-1.4 (2H, m), 1.4-1.8 (3H, m), 3.0-3.2 (4H, m), 3.3-3.5 (4H, m), 3.87 (2H, t, $J=6.3\text{Hz}$), 6.83 (2H, d, $J=9.0\text{Hz}$), 6.9-7.1 (4H, m), 7.79 (2H, d, $J=8.8\text{Hz}$), 12.33 (1H, s)

APCI-MASS : $m/z = 383$ ($M+H^+$)10 Preparation 179

4-[4-[4-(8-Bromooctyloxy)phenyl]piperazin-1-yl]benzoic acid dihydrochloride

IR (KBr) : 1670.1, 1602.6, 1511.9, 1234.2 cm^{-1}

NMR (DMSO- d_6 , δ) : 1.2-1.5 (8H, m), 1.6-1.9 (4H, m), 3.0-3.2 (4H, m), 3.2-3.5 (4H, m), 3.52 (2H, t, $J=6.7\text{Hz}$), 3.88 (2H, t, $J=6.4\text{Hz}$), 6.83 (2H, d, $J=9.1\text{Hz}$), 6.94 (2H, d, $J=9.1\text{Hz}$), 7.02 (2H, d, $J=8.9\text{Hz}$), 7.79 (2H, d, $J=8.9\text{Hz}$)

20 Preparation 180

3-Fluoro-4-[4-(4-n-hexyloxyphenyl)piperazin-1-yl]benzoic acid dihydrochloride

IR (KBr) : 1673.9, 1511.9, 1240.0 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.88 (3H, t, $J=6.5\text{Hz}$), 1.2-1.5 (6H, m), 1.6-1.8 (2H, m), 3.0-3.5 (8H, m), 3.88 (2H, t, $J=6.4\text{Hz}$), 6.7-7.2 (5H, m), 7.4-7.8 (2H, m), 12.82 (1H, s)

APCI-MASS : $m/z = 401$ (M^++H)

30 The following compound was obtained according to a similar manner to that of Preparation 46.

Preparation 181

35 1-(4-Methoxycarbonylphenyl)-3-(4-n-hexyloxyphenyl)-propan-1,3-dione

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IR (KBr) : 2956, 2927, 2856, 1722, 1511, 1284,
1108 cm^{-1}

NMR (CDCl_3 , δ) : 0.92 (3H, t, $J=6.4\text{Hz}$), 1.2-2.0 (8H,
m), 3.96 (3H, s), 4.04 (2H, t, $J=6.5\text{Hz}$), 6.82 (1H,
s), 6.97 (2H, d, $J=8.7\text{Hz}$), 7.9-8.1 (4H, m), 8.14
(2H, d, $J=8.3\text{Hz}$)

APCI-MASS : $m/z = 383$ ($\text{M}+\text{H}^+$)

The following compounds (Preparations 182 to 185) were
obtained according to a similar manner to that of Preparation
47.

Preparation 182

Methyl 5-(4-octyloxyphenyl)-1-methylpyrazole-3-
carboxylate

IR (KBr pelet) : 2923, 1724, 1616, 1513, 1446, 1251,
1120 cm^{-1}

NMR (CDCl_3 , δ) : 0.89 (3H, t, $J=6.8\text{Hz}$), 1.2-1.5 (10H,
m), 1.7-1.9 (2H, m), 3.90 (3H, s), 3.98 (2H, t,
 $J=6.6\text{Hz}$), 4.20 (3H, s), 6.92 (2H, d, $J=8.9\text{Hz}$), 7.04
(1H, s), 7.89 (2H, d, $J=8.9\text{Hz}$)

APCI-MASS : $m/z = 345$ ($\text{M}+\text{H}^+$)

Preparation 183

Methyl 4-[5-(4-n-pentyloxyphenyl)pyrazol-3-yl]benzoate

IR (KBr) : 3236, 2952, 2873, 1716, 1616, 1508, 1276,
1174, 1106 cm^{-1}

NMR (CDCl_3 , δ) : 0.94 (3H, t, $J=7.0\text{Hz}$), 1.3-1.5 (4H,
m), 1.7-1.9 (2H, m), 3.92 (3H, s), 3.96 (2H, t,
 $J=6.7\text{Hz}$), 6.78 (1H, s), 6.88 (2H, d, $J=8.7\text{Hz}$), 7.55
(2H, d, $J=8.7\text{Hz}$), 7.79 (2H, d, $J=8.4\text{Hz}$), 8.02 (2H,
d, $J=8.4\text{Hz}$)

APCI-MASS : $m/z = 365$ ($\text{M}+\text{H}^+$)

Preparation 184

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Methyl 5-(4-octyloxyphenyl)isoxazole-3-carboxylate

IR (KBr pelet) : 2950, 2921, 1724, 1614, 1510, 1446,
1257, 1178, 1143, 1009 cm^{-1}

5 NMR (CDCl_3 , δ) : 0.89 (3H, t, $J=6.8\text{Hz}$), 1.2-1.6 (10H, m), 1.7-1.9 (2H, m), 4.0-4.1 (5H, m), 6.80 (1H, s), 6.98 (2H, dd, $J=6.9$ and 2.1Hz), 7.73 (2H, dd, $J=6.9$ and 2.1Hz)

APCI-MASS : m/z = 332 ($\text{M}+\text{H}^+$)

10 Preparation 185

Methyl 4-[3-(4-n-hexyloxyphenyl)pyrazol-5-yl]benzoate

IR (KBr) : 2952, 1716, 1616, 1508, 1276, 1106 cm^{-1}

15 NMR (CDCl_3 , δ) : 0.91 (3H, t, $J=6.3\text{Hz}$), 1.2-1.6 (6H, m), 1.7-1.9 (2H, m), 3.8-4.0 (5H, m), 6.76 (1H, s), 6.86 (2H, d, $J=8.8\text{Hz}$), 7.54 (2H, d, $J=8.8\text{Hz}$), 7.77 (2H, d, $J=8.4\text{Hz}$), 8.00 (2H, d, $J=8.4\text{Hz}$)

APCI-MASS : m/z = 379 ($\text{M}+\text{H}^+$)

Preparation 186

20 A suspension of 1-(4-n-Pentyloxyphenyl)-3-(4-ethoxycarbonylphenyl)-1-buten-3-one (74.43 g) and hydroxyamine hydrochloride (28.23 g) and potassium carbonate (56.11 g) in ethanol (400 ml) was refluxed for 4 hours. The mixture was diluted with ethyl acetate, washed with water
25 (x 2), brine and dried over magnesium sulfate. The solvents were removed under reduced pressure to give crude oxime. To a solution of crude oxime in dichloroethane (500 ml) was added activated-manganese(IV) oxide (200 g). The reaction mixture was refluxed for 2 hours and filtered. The residue
30 was washed with dichloromethane. The solvents were removed under reduced pressure and the residue was triturated with acetonitrile. The solid was collected by filtration and dried to give ethyl 4-[5-(4-n-Pentyloxyphenyl)isoxazol-3-yl]benzoate (21.07 g).

35 IR (KBr) : 2945, 2872, 1717, 1615, 1508, 1280,

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1108 cm^{-1}

5 NMR (CDCl_3 , δ) : 0.95 (3H, t, $J=6.9\text{Hz}$), 1.3-1.9 (9H, m), 4.01 (2H, t, $J=6.5\text{Hz}$), 4.41 (2H, q, $J=7.1\text{Hz}$), 6.74 (1H, s), 6.99 (2H, d, $J=8.8\text{Hz}$), 7.76 (2H, d, $J=8.8\text{Hz}$), 7.93 (2H, d, $J=8.4\text{Hz}$), 8.15 (2H, d, $J=8.4\text{Hz}$)

APCI-MASS : $m/z = 380$ ($\text{M}+\text{H}^+$)

10 The following compounds (Preparations 187 to 190) were obtained according to a similar manner to that of Preparation 48.

Preparation 187

15 Methyl 6-[4-[4-(8-Methoxyoctyloxy)phenyl]piperazin-1-yl]nicotinate

IR (KBr) : 2933, 2858, 1722, 1608, 1513, 1432, 1405, 1278, 1245 cm^{-1}

20 NMR (CDCl_3 , δ) : 1.3-1.9 (12H, m), 3.16 (4H, t, $J=5.0\text{Hz}$), 3.33 (3H, s), 3.36 (2H, t, $J=6.5\text{Hz}$), 3.8-4.0 (9H, m), 6.64 (1H, d, $J=9.1\text{Hz}$), 6.85 (2H, d, $J=9.2\text{Hz}$), 6.93 (2H, d, $J=9.2\text{Hz}$), 8.04 (1H, dd, $J=9.1$ and 2.2Hz), 8.81 (1H, d, $J=2.2\text{Hz}$)

APCI-MASS : $m/z = 456$ ($\text{M}+\text{H}^+$)

25 Preparation 188

4-[4-(5-Methoxypentyloxy)phenyl]bromobenzene

IR (KBr) : 2940, 2856, 1604, 1479, 1286, 1255, 1124 cm^{-1}

30 NMR (CDCl_3 , δ) : 1.5-1.9 (6H, m), 3.34 (3H, s), 3.41 (2H, t, $J=6.1\text{Hz}$), 3.99 (2H, t, $J=6.4\text{Hz}$), 6.95 (2H, d, $J=8.7\text{Hz}$), 7.4-7.6 (6H, m)

APCI-MASS : $m/z = 349$ ($\text{M}+\text{H}^+$)

Preparation 189

35 Methyl 6-(8-methoxyoctyloxy)-2-naphthoate

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NMR (DMSO-d₆, δ) : 1.2-1.6 (10H, m), 1.7-1.9 (2H, m),
3.20 (3H, s), 3.29 (2H, t, J=6.4Hz), 3.89 (3H, s),
4.11 (2H, t, J=6.4Hz), 7.24 (1H, dd, J=9.0 and
2.4Hz), 7.40 (1H, d, J=2.4Hz), 7.88 (1H, d,
5 J=8.7Hz), 7.94 (1H, dd, J=8.7 and 1.5Hz), 8.03 (1H,
d, J=9.0Hz), 8.55 (1H, d, J=1.5Hz)

Preparation 190

4-[4-[4-(8-Methoxyoctyloxy)phenyl]piperazin-1-yl]benzoic
10 acid dihydrochloride

IR (KBr) : 1668.1, 1602.6, 1511.9, 1236.1 cm⁻¹

NMR (DMSO-d₆, δ) : 1.2-1.8 (12H, m), 3.05-3.2 (4H, m),
3.29 (2H, t, J=7.1Hz), 3.33 (3H, s), 3.4-3.55 (4H,
m), 3.88 (2H, t, J=6.4Hz), 6.82 (2H, d, J=9.0Hz),
15 6.94 (2H, d, J=9.0Hz), 7.02 (2H, d, J=8.8Hz), 7.79
(2H, d, J=8.8Hz), 12.31 (1H, s)

The following compounds (Preparations 191 to 254) were
obtained according to a similar manner to that of Preparation
20 49.

Preparation 191

1-[4-[4-[4-[2-(4-Methylpentyl)-2,3-dihydro-4H-1,2,4-
triazol-3-one-4-yl]phenyl]piperazin-1-yl]benzoyl]-
25 benzotriazole 3-oxide

IR (KBr) : 1766.5, 1693.2, 1600.6, 1519.6 cm⁻¹

Preparation 192

1-[4-(4-Octylphenyl)-2,3-dihydro-4H-1,2,4-triazol-3-one-
30 2-yl-acetyl]benzotriazole 3-oxide

IR (KBr) : 2921.6, 1753.0, 1720.0, 1423.2 cm⁻¹

NMR (CDCl₃, δ) : 0.88 (3H, t, J=6.7Hz), 1.2-1.4 (10H,
m), 1.5-1.8 (2H, m), 2.65 (2H, t, J=7.5Hz), 5.46
(2H, s), 7.30 (2H, d, J=8.5Hz), 7.48 (2H, d,
35 J=8.5Hz), 7.62 (1H, t, J=8.3Hz), 7.80 (1H, s), 7.82

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(1H, t, J=8.3Hz), 8.05 (1H, d, J=8.3Hz), 8.37 (1H, d, J=8.3Hz)

Preparation 193

5 1-[4-[4-[4-(7-Methoxyheptyloxy)phenyl]piperazin-1-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 1783.8, 1600.6, 1511.9, 1232.3, 1184.1 cm^{-1}

10 NMR (CDCl_3 , δ) : 1.3-1.9 (10H, m), 3.2-3.3 (4H, m), 3.34 (3H, s), 3.38 (2H, t, J=6.4Hz), 3.5-3.7 (4H, m), 3.92 (2H, t, J=6.5Hz), 6.87 (2H, d, J=9.2Hz), 6.95 (2H, d, J=9.2Hz), 7.00 (2H, d, J=9.0Hz), 7.3-7.6 (3H, m), 8.09 (1H, d, J=8.2Hz), 8.15 (2H, d, J=9.0Hz)

15 Preparation 194

1-[4-[4-(4-n-Heptyloxyphenyl)piperazin-1-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 1783.8, 1600.6, 1511.9, 1230.4, 1184.1 cm^{-1}

20 NMR (CDCl_3 , δ) : 0.90 (3H, t, J=6.3Hz), 1.2-1.6 (8H, m), 1.7-1.9 (2H, m), 3.2-3.3 (4H, m), 3.5-3.7 (4H, m), 3.93 (2H, t, J=6.5Hz), 6.87 (2H, d, J=9.2Hz), 6.95 (2H, d, J=9.2Hz), 7.00 (2H, d, J=9.0Hz), 7.3-7.7 (3H, m), 8.09 (1H, d, J=8.2Hz), 8.15 (2H, d, J=9.0Hz)

25 Preparation 195

1-[4-[4-[4-(4-Methylpentylloxy)phenyl]piperazin-1-yl]benzoyl]benzotriazole 3-oxide

30 NMR (CDCl_3 , δ) : 0.92 (6H, d, J=6.6Hz), 1.2-1.4 (2H, m), 1.5-1.9 (3H, m), 3.1-3.3 (4H, m), 3.5-3.7 (4H, m), 3.92 (2H, t, J=6.6Hz), 6.87 (2H, d, J=9.3Hz), 6.96 (2H, d, J=9.3Hz), 7.01 (2H, d, J=9.0Hz), 7.4-7.6 (3H, m), 8.10 (1H, d, J=8.2Hz), 8.15 (2H, d, J=9.0Hz)

35

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Preparation 196

1-[4-[4-(4-n-Pentyloxyphenyl)piperazin-1-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 1787.7, 1600.6, 1511.9, 1232.3, 1184.1 cm^{-1}

5 NMR (CDCl_3 , δ) : 0.93 (3H, t, $J=6.9\text{Hz}$), 1.3-1.6 (4H, m), 1.7-1.9 (2H, m), 3.1-3.4 (4H, m), 3.5-3.8 (4H, m), 3.93 (2H, t, $J=6.6\text{Hz}$), 6.87 (2H, d, $J=9.2\text{Hz}$), 6.92 (2H, d, $J=9.2\text{Hz}$), 7.01 (2H, d, $J=9.1\text{Hz}$), 7.4-7.6 (3H, m), 8.10 (1H, d, $J=8.2\text{Hz}$), 8.15 (2H, d, $J=9.1\text{Hz}$)

Preparation 197

1-[4-[4-[8-(1H-Tetrazol-1-yl)octyloxy]phenyl]benzoyl]benzotriazole 3-oxide

15 and

1-[4-[4-[8-(2H-tetrazol-2-yl)octyloxy]phenyl]benzoyl]benzotriazole 3-oxide

20 IR (KBr) : 1778.0, 1602.6, 1189.9, 981.6 cm^{-1}

NMR (CDCl_3 , δ) : 1.2-1.6 (8H, m), 1.7-1.9 (2H, m), 1.9-2.2 (2H, m), 4.02 (2H, t, $J=6.4\text{Hz}$), 4.44 and 4.66 (2H, t, $J=7.1\text{Hz}$), 7.02 (2H, d, $J=8.8\text{Hz}$), 7.4-7.6 (3H, m), 7.63 (2H, d, $J=8.8\text{Hz}$), 7.79 (2H, d, $J=8.6\text{Hz}$), 8.12 (1H, d, $J=8.2\text{Hz}$), 8.32 (2H, d, $J=8.6\text{Hz}$), 8.51 and 8.60 (1H, s)

Preparation 198

30 1-[4-[4-[8-(2,6-Dimethylmorpholin-4-yl)octyloxy]phenyl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 1778.0, 1600.6, 977.7 cm^{-1}

35 NMR (CDCl_3 , δ) : 1.18 (6H, d, $J=6.3\text{Hz}$), 1.2-1.7 (10H, m), 1.7-2.0 (4H, m), 2.4-2.6 (2H, m), 2.9-3.2 (2H, m), 3.7-3.9 (2H, m), 4.01 (2H, t, $J=6.5\text{Hz}$), 7.02 (2H, d, $J=8.8\text{Hz}$), 7.4-7.7 (3H, m), 7.63 (2H, d,

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J=8.8Hz), 7.79 (2H, d, J=8.5Hz), 8.12 (1H, d, J=8.1Hz), 8.32 (2H, d, J=8.5Hz)

Preparation 199

5 1-[6-[4-(4-Octyloxyphenyl)piperazin-1-yl]nicotinoyl]-
benzotriazole 3-oxide

IR (KBr pelet) : 2922, 2854, 1766, 1602, 1513, 1417,
1234, 1025, 950, 813 cm^{-1}

10 NMR (CDCl_3 , δ) : 0.89 (3H, t, J=6.8Hz), 1.2-1.5 (10H, m), 1.7-1.9 (2H, m), 3.1-3.3 (4H, m), 3.9-4.1 (6H, m), 6.75 (1H, d, J=9.2Hz), 6.87 (2H, d, J=9.2Hz), 6.95 (2H, d, J=9.2Hz), 7.4-7.6 (3H, m), 8.10 (1H, d, J=8.1Hz), 8.19 (1H, dd, J=9.2 and 2.4Hz), 9.04 (1H, d, J=2.4Hz)

15 APCI-MASS : m/z = 529 ($\text{M}+\text{H}^+$)

Preparation 200

1-[2-(4-Hexyloxyphenyl)benzoxazol-5-yl-carbonyl]-
benzotriazole 3-oxide

20 IR (KBr) : 2950, 1774, 1623, 1504, 1265, 1176 cm^{-1}

NMR (CDCl_3 , δ) : 0.93 (3H, t, J=6.9Hz), 1.3-1.6 (6H, m), 1.8-2.0 (2H, m), 4.07 (2H, t, J=6.5Hz), 7.06 (2H, d, J=8.9Hz), 7.4-7.6 (3H, m), 7.75 (1H, d, J=8.6Hz), 8.13 (1H, d, J=8.2Hz), 8.2-8.4 (3H, m),
25 8.67 (1H, d, J=1.6Hz)

APCI-MASS : m/z = 457 ($\text{M}+\text{H}^+$)

Preparation 201

30 1-[4-[4-(4-n-Butyloxyphenyl)phenyl]benzoyl]-
benzotriazole 3-oxide

IR (KBr) : 2958, 2871, 1776, 1600, 1398, 1255, 1211,
1037 cm^{-1}

35 NMR (CDCl_3 , δ) : 1.00 (3H, t, J=7.2Hz), 1.4-1.9 (4H, m), 4.03 (2H, t, J=6.4Hz), 7.01 (2H, d, J=8.3Hz), 7.4-7.8 (9H, m), 7.87 (2H, d, J=8.1Hz), 8.12 (1H,

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d, J=8.4Hz), 8.36 (2H, d, J=7.9Hz)

APCI-MASS : m/z = 464 (M+H)⁺Preparation 202

5 1-[2-(4-Heptyloxyphenyl)pyridin-5-yl-
carbonyl]benzotriazole 3-oxide

IR (KBr) : 2944, 2867, 1793, 1770, 1589, 1471, 1321,
1093 cm⁻¹

10 NMR (CDCl₃, δ) : 0.91 (3H, t, J=6.7Hz), 1.2-1.6 (8H,
m), 1.7-1.9 (2H, m), 4.05 (2H, t, J=6.5Hz), 7.04
(2H, d, J=8.0Hz), 7.4-7.6 (3H, m), 7.91 (1H, d,
J=8.5Hz), 8.1-8.2 (3H, m), 8.51 (1H, dd, J=8.5 and
2.3Hz), 9.47 (1H, d, J=2.3Hz)

APCI-MASS : m/z = 431 (M+H⁺)

15

Preparation 203

1-[2-(2-Octyloxyppyridin-5-yl)benzoxazol-5-yl-
carbonyl]benzotriazole 3-oxide

20 IR (KBr pelet) : 2925, 2854, 1787, 1623, 1479, 1263,
989 cm⁻¹

25 NMR (CDCl₃, δ) : 0.89 (3H, t, J=6.8Hz), 1.2-1.5 (10H,
m), 1.8-1.9 (2H, m), 4.42 (2H, t, J=6.7Hz), 6.91
(1H, d, J=8.7Hz), 6.4-6.6 (3H, m), 7.79 (1H, d,
J=8.6Hz), 8.13 (1H, d, J=8.2Hz), 8.32 (1H, dd,
J=8.6 and 1.7Hz), 8.41 (1H, dd, J=8.7 and 2.4Hz),
8.70 (1H, d, J=1.4Hz), 9.07 (1H, d, J=1.9Hz)

APCI-MASS : m/z = 486 (M+H⁺)Preparation 204

30 1-[2-[4-(4-Hexylphenyl)phenyl]benzoxazol-5-yl-
carbonyl]benzotriazole 3-oxide

IR (KBr) : 2927, 2854, 1785, 1621, 1490, 1261, 1166,
1052 cm⁻¹

35 NMR (CDCl₃, δ) : 0.90 (3H, t, J=6.5Hz), 1.2-1.8 (8H,
m), 2.68 (2H, t, J=7.9Hz), 7.31 (2H, d, J=8.2Hz),

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7.4-7.7 (5H, m), 7.79-7.81 (3H, m), 8.13 (1H, d, J=8.3Hz), 8.3-8.4 (3H, m), 8.73 (1H, d, J=1.3Hz)
APCI-MASS : m/z = 517 (M+H⁺)

5 Preparation 205

1-[2-[4-(4-n-Butyloxyphenyl)phenyl]pyridin-5-yl-carbonyl]benzotriazole 3-oxide

IR (KBr) : 2956, 2933, 2871, 1774, 1650, 1591, 1471, 1251 cm⁻¹

10 NMR (CDCl₃, δ) : 1.00 (3H, t, J=7.2Hz), 1.5-1.9 (4H, m), 4.03 (2H, t, J=6.4Hz), 7.02 (2H, d, J=8.6Hz), 7.4-7.6 (3H, m), 7.54 (2H, d, J=7.3Hz), 7.62 (2H, d, J=8.5Hz), 8.02 (1H, d, J=8.3Hz), 8.13 (1H, d, J=8.2Hz), 8.21 (2H, d, J=7.9Hz), 8.57 (1H, dd, J=8.3 and 2.0Hz), 9.54 (1H, d, J=2.0Hz)

15 APCI-MASS : m/z = 465 (M+H)⁺

Preparation 206

20 1-[4-[4-(5-Phenoxyphenyloxy)phenyl]benzoyl]-benzotriazole 3-oxide

IR (KBr) : 2944, 2869, 1770, 1600, 1494, 1249, 1189 cm⁻¹

25 NMR (CDCl₃, δ) : 1.6-1.8 (2H, m), 1.8-2.0 (4H, m), 4.01 (2H, t, J=6.3Hz), 4.07 (2H, t, J=6.2Hz), 6.91 (2H, d, J=8.9Hz), 7.04 (2H, d, J=8.7Hz), 7.3-7.6 (4H, m), 7.63 (2H, d, J=8.6Hz), 7.78 (2H, d, J=8.4Hz), 8.12 (1H, d, J=8.1Hz), 8.32 (2H, d, J=8.4Hz)

30 APCI-MASS : m/z = 494 (M+H)⁺

Preparation 207

35 1-[4-[5-(4-Hexyloxyphenyl)-1,3,4-oxadiazol-2-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 2956, 2921, 2856, 1778, 1612, 1496, 1261, 1232, 1025 cm⁻¹

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NMR (CDCl₃, δ) : 0.92 (3H, t, J=6.7Hz), 1.3-1.6 (6H, m), 1.8-2.0 (2H, m), 4.05 (2H, t, J=6.5Hz), 7.05 (2H, d, J=8.7Hz), 7.4-7.6 (3H, m), 8.10 (2H, d, J=8.7Hz), 8.13 (1H, d, J=7.4Hz), 8.37 (2H, d, J=8.5Hz), 8.45 (2H, d, J=8.5Hz)

APCI-MASS : m/z = 484 (M+H)⁺

Preparation 208

1-[4-[5-(4-n-Hexyloxyphenyl)-1,3,4-thiadiazol-2-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 2952, 2873, 1774, 1602, 1261, 1230, 1176 cm⁻¹

NMR (CDCl₃, δ) : 0.93 (3H, t, J=6.8Hz), 1.3-2.0 (8H, m), 4.04 (2H, t, J=6.5Hz), 7.02 (2H, d, J=8.7Hz), 7.4-7.7 (3H, m), 7.98 (2H, d, J=8.7Hz), 8.13 (1H, d, J=8.7Hz), 8.25 (2H, d, J=8.3Hz), 8.41 (2H, d, J=8.3Hz)

APCI-MASS : m/z = 500 (M+H)⁺

20 Preparation 209

1-[5-(4-Octyloxyphenyl)-1-methylpyrazol-3-yl-carbonyl]benzotriazole 3-oxide

IR (KBr pelet) : 2939, 2852, 1776, 1687, 1612, 1448, 1249, 995 cm⁻¹

NMR (CDCl₃, δ) : 0.89 (3H, t, J=6.7Hz), 1.3-1.5 (10H, m), 1.7-1.9 (2H, m), 4.01 (2H, t, J=6.5Hz), 4.25 (3H, s), 6.97 (2H, d, J=6.8Hz), 7.4-7.7 (4H, m), 7.78 (2H, d, J=6.8Hz), 8.14 (1H, d, J=8.0Hz)

APCI-MASS : m/z = 448 (M+H)⁺

30 Preparation 210

1-[4-[5-(4-n-Pentyloxyphenyl)pyrazol-3-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 3251, 2956, 2869, 1780, 1612, 1506, 1232, 985 cm⁻¹

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NMR (CDCl₃, δ) : 0.95 (3H, t, J=6.9Hz), 1.3-1.6 (4H, m), 1.7-2.0 (2H, m), 4.01 (2H, t, J=6.6Hz), 6.90 (1H, s), 6.99 (2H, d, J=8.7Hz), 7.4-7.6 (5H, m), 8.0-8.2 (3H, m), 8.33 (2H, d, J=8.4Hz)

5 APCI-MASS : m/z = 468 (M+H⁺)

Preparation 211

1-[5-[4-(4-n-Butoxyphenyl)phenyl]furan-2-yl-carbonyl]benzotriazole 3-oxide

10 IR (KBr) : 2958, 2871, 1781, 1678, 1603, 1535, 1479, 1265 cm⁻¹

NMR (CDCl₃, δ) : 1.00 (3H, t, J=7.3Hz), 1.4-1.9 (4H, m), 4.02 (2H, t, J=6.4Hz), 6.9-7.1 (3H, m), 7.4-8.2 (11H, m)

15 APCI-MASS : m/z = 351 (Methyl ester)

Preparation 212

1-(3-(S)-Hydroxy-2-benzylhexadecanoyl)benzotriazole 3-oxide

20 IR (Neat) : 2854.1, 1814.7, 1459.8, 742.5 cm⁻¹

Preparation 213

1-(3-(R)-Benzyloxycarboxylamino-18-methoxyoctadecanoyl)-benzotriazole 3-oxide

25 IR (KBr) : 1805.0, 1729.8, 1695.1 cm⁻¹

NMR (DMSO-d₆, δ) : 1.1-1.65 (30H, m), 3.20 (3H, s), 3.28 (2H, t, J=6.5Hz), 4.01 (1H, m), 5.06 (2H, s), 7.32 (5H, m), 7.4-7.8 (3H, m), 8.12 (1H, d, J=7Hz)

30 Preparation 214

1-(3-(S)-Hydroxyhexadecanoyl)benzotriazole 3-oxide

IR (KBr) : 1710.6, 1498.4, 1429.0, 771.4 cm⁻¹

NMR (CDCl₃, δ) : 0.88 (3H, t, J=6.4Hz), 1.2-1.7 (24H, m), 2.00 (1H, s), 3.1-3.5 (2H, m), 4.30 (1H, m), 7.59 (1H, t, J=7.8Hz), 7.81 (1H, t, J=7.8Hz), 8.02

35

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(1H, d, J=8.3Hz), 8.42 1(1H, d, J=8.3Hz)

Preparation 215

1-(3-Methyl-2-tridecenoyl)benzotriazole 3-oxide

5 IR (KBr) : 2927.4, 1791.5, 1633.4, 1081.9 cm^{-1} NMR (CDCl_3 , δ) : 0.89 (3H, t, J=6.3Hz), 1.1-1.7 (20H, m), 2.25 (3H, s), 6.08 (1H, s), 7.3-7.6 (3H, m), 8.06 (1H, d, J=8.2Hz)10 Preparation 216

1-[4-[4-[4-(8-Methoxyoctyloxy)phenyl]piperazin-1-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 1780.0, 1600.6, 1511.9, 1234.2, 1184.1 cm^{-1} 15 NMR (CDCl_3 , δ) : 1.3-1.9 (12H, m), 3.24 (4H, t, J=5.0Hz), 3.33 (3H, s), 3.37 (2H, t, J=6.8Hz), 3.62 (4H, t, J=5.0Hz), 3.92 (2H, t, J=6.5Hz), 6.8-7.1 (6H, m), 7.35-7.65 (3H, m), 8.09 (1H, d, J=8.2Hz), 8.15 (2H, d, J=9.0Hz)20 Preparation 217

1-[3-Fluoro-4-[4-(4-n-hexyloxyphenyl)piperazin-1-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 1778.0 cm^{-1} 25 Preparation 218

1-[3-Chloro-4-[4-(4-n-hexyloxyphenyl)piperazin-1-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 1778.0, 1594.8, 1511.9, 1218.8 cm^{-1} 30 NMR (CDCl_3 , δ) : 0.91 (3H, t, J=6.5Hz), 1.2-1.6 (6H, m), 1.6-1.9 (2H, m), 3.29 (4H, t, J=3.6Hz), 3.44 (4H, t, J=3.6Hz), 3.93 (2H, t, J=6.5Hz), 6.87 (2H, d, J=9.2Hz), 6.97 (2H, d, J=9.2Hz), 7.19 (1H, d, J=8.6Hz), 7.4-7.7 (3H, m), 8.10 (1H, d, J=6.4Hz), 8.14 (1H, dd, J=8.6 and 2.1Hz), 8.27 (1H, d, J=2.1Hz)

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APCI-MASS : $m/z = 534$ ($M^+ + H$)Preparation 219

5 1-[4-(4-Piperidinopiperidin-1-yl)benzoyl]benzotriazole
3-oxide

IR (KBr) : 1758.8, 1602.6, 1186.0 cm^{-1}

10 NMR (CDCl_3 , δ) : 1.35-1.8 (8H, m), 1.96 (2H, d,
J=13Hz), 2.45-2.7 (5H, m), 2.97 (2H, td, J=12.8 and
2.6Hz), 4.04 (2H, d, J=13Hz), 6.93 (2H, d,
J=9.2Hz), 7.35-7.6 (3H, m), 8.1-8.4 (3H, m)

Preparation 220

15 1-[3-[4-(4-n-Hexyloxyphenyl)piperazin-1-yl]pyridazin-6-
yl-carbonyl]benzotriazole 3-oxide

IR (KBr) : 1787.7, 1585.2, 1511.9, 1240.0 cm^{-1} Preparation 221

20 1-[5-[4-(4-n-Hexyloxyphenyl)piperazin-1-yl]picolinoyl]-
benzotriazole 3-oxide

IR (KBr) : 1766.5, 1575.6, 1511.9, 1232.3 cm^{-1}

25 NMR (CDCl_3 , δ) : 0.91 (3H, t, J=6.5Hz), 1.2-1.6 (6H,
m), 1.65-1.9 (2H, m), 3.27 (4H, t, J=5.1Hz), 3.66
(4H, t, J=5.1Hz), 3.93 (2H, t, J=6.5Hz), 6.88 (2H,
d, J=9.2Hz), 6.95 (2H, d, J=9.2Hz), 7.25 (1H, dd,
J=7.6 and 2.9Hz), 7.35-7.6 (3H, m), 8.09 (1H, d,
J=8.2Hz), 8.18 (1H, d, J=8.9Hz), 8.52 (1H, d,
J=2.9Hz)

APCI-MASS : $m/z = 501$ ($M^+ + H$)

30 Preparation 222

1-[4-[4-(4-Cyclohexylphenyl)piperazin-1-yl]benzoyl]-
benzotriazole 3-oxide

IR (KBr) : 1770.3, 1602.6, 1515.8, 1232.3, 1186.0 cm^{-1}

35 NMR (CDCl_3 , δ) : 1.15-1.5 (6H, m), 1.65-2.0 (4H, m),
2.45 (1H, m), 3.33 (4H, t, J=5.1Hz), 3.62 (4H, t,

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J=5.1Hz), 6.92 (2H, d, J=8.7Hz), 6.99 (2H, d, J=9.2Hz), 7.16 (2H, d, J=8.7Hz), 7.35-7.65 (3H, m), 8.09 (1H, d, J=8.2Hz), 8.15 (2H, d, J=9.2Hz)

5 Preparation 223

1-[4-[4-(4-n-Hexylphenyl)piperazin-1-yl]benzoyl]-
benzotriazole 3-oxide

IR (KBr) : 1768.4, 1602.6, 1515.8, 1230.4, 1184.1 cm^{-1}

10 NMR (CDCl_3 , δ) : 0.89 (3H, t, J=6.5Hz), 1.2-1.45 (6H, m), 1.5-1.7 (2H, m), 2.55 (2H, t, J=7.6Hz), 3.2-3.4 (4H, m), 3.5-3.7 (4H, m), 6.91 (2H, d, J=8.6Hz), 7.00 (2H, d, J=9.1Hz), 7.13 (2H, d, J=8.5Hz), 7.35-7.6 (3H, m), 8.09 (1H, d, J=8.2Hz), 8.15 (2H, d, J=9.1Hz)

15

Preparation 224

1-[4-[4-(4-Phenylcyclohexyl)piperazin-1-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 1780.0, 1762.6, 1602.6, 1234.2, 1182.2 cm^{-1}

20 NMR (CDCl_3 , δ) : 1.3-1.7 (4H, m), 1.95-2.15 (4H, m), 2.35-2.6 (2H, m), 2.79 (4H, t, J=5.0Hz), 3.49 (4H, t, J=5.0Hz), 6.95 (2H, d, J=9.0Hz), 7.1-7.35 (5H, m), 7.35-7.6 (3H, m), 8.08 (1H, d, J=7.1Hz), 8.12 (2H, d, J=9.0Hz)

25

Preparation 225

1-[4-[4-[1-(4-n-Hexyloxyphenyl)piperidin-4-yl]piperazin-1-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 1768.4, 1602.6, 1511.9, 1234.2 cm^{-1}

30 NMR (CDCl_3 , δ) : 0.90 (3H, t, J=6.5Hz), 1.2-1.55 (6H, m), 1.6-1.9 (4H, m), 1.96 (2H, d, J=11Hz), 2.44 (1H, m), 2.64 (2H, d, J=1.1Hz), 2.77 (4H, t, J=5.0Hz), 3.48 (4H, t, J=5.0Hz), 3.59 (2H, d, J=11Hz), 3.91 (2H, t, J=6.5Hz), 6.7-7.05 (6H, m), 7.35-7.6 (3H, m), 8.08 (1H, d, J=6.9Hz), 8.12 (2H,

35

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d, $J=7.7\text{Hz}$)Preparation 226

5 1-[4-(4-Trans-n-pentylcyclohexyl)benzoyl]benzotriazole
3-oxide

IR (KBr) : 1799.3, 1778.0, 1608.3, 1228.4, 977.7 cm^{-1}

10 NMR (CDCl_3 , δ) : 0.91 (3H, t, $J=6.6\text{Hz}$), 1.0-1.7 (13H,
m), 1.93 (4H, d, $J=9.8\text{Hz}$), 2.62 (1H, t, $J=12\text{Hz}$),
7.35-7.6 (5H, m), 8.09 (1H, d, $J=7.9\text{Hz}$), 8.19 (2H,
d, $J=8.4\text{Hz}$)

Preparation 227

15 1-[6-(8-Methoxyoctyloxy)-2-naphthoyl]benzotriazole 3-
oxide

IR (KBr) : 2931.3, 2856.1, 1778.0, 1623.8 cm^{-1} Preparation 228

20 1-(E)-[3-[4-[4-(7-Fluoroheptyloxy)phenyl]phenyl]-
acryloyl]benzotriazole 3-oxide

IR (KBr) : 3070.1, 2935.1, 2859.9, 1700.9, 1619.9,
1596.8 cm^{-1}

25 NMR (CDCl_3 , δ) : 1.30-2.00 (10H, m), 4.02 (2H, t,
 $J=6.4\text{Hz}$), 4.45 (2H, dt, $J=47.5$ and 6.2Hz), 6.70-
8.65 (14H, m)

Preparation 229

1-(6-Heptylnaphthalene-2-carbonyl)benzotriazole 3-oxide

30 NMR ($\text{DMSO}-d_6$, δ) : 0.75-0.93 (3H, m), 1.10-1.45 (8H,
m), 1.55-1.80 (2H, m), 2.68-2.90 (2H, m), 7.35-9.06
(10H, m)

APCI-MASS : $m/z = 388$ (M^++1)Preparation 230

35 1-(E)-[3-[4-[4-(8-Methoxyoctyloxy)phenyl]phenyl]-
acryloyl]benzotriazole 3-oxide

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Preparation 231

1-(E)-[3-[4-[4-(5-Hexenyloxy)phenyl]phenyl]acryloyl]-
benzotriazole 3-oxide

5 IR (KBr) : 3072.0, 3033.5, 2939.0, 2865.7, 1780.0,
1693.2, 1619.9, 1596.8 cm^{-1}

NMR (DMSO- d_6 , δ) : 1.43-1.66 (2H, m), 1.66-1.90 (2H,
m), 2.02-2.23 (2H, m), 3.90-4.16 (2H, m), 4.90-5.13
(2H, m), 5.72-6.00 (1H, m), 6.93-8.30 (14H, m)

10 APCI-MASS : m/z = 337 (Methyl ester, $M^+ + 1$)

Preparation 232

1-(E)-[3-[4-[4-(4-Methylpentyloxy)phenyl]phenyl]-
acryloyl]benzotriazole 3-oxide

15 IR (KBr) : 3072.0, 3033.5, 2952.5, 2869.6, 1780.0,
1693.2, 1618.0, 1598.7 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.90 (6H, d, $J=6.5\text{Hz}$), 1.20-1.40
(2H, m), 1.50-1.90 (3H, m), 3.90-4.10 (2H, m),
6.40-8.30 (14H, m)

20 APCI-MASS : m/z = 442 ($M^+ + 1$)

Preparation 233

1-(E)-[3-[4-[4-(6-Fluorohexyloxy)phenyl]phenyl]-
acryloyl]benzotriazole 3-oxide

25 IR (KBr) : 3074.0, 3033.5, 2939.0, 2865.7, 1780.0,
1697.1, 1598.7 cm^{-1}

NMR (DMSO- d_6 , δ) : 1.25-1.83 (6H, m), 4.04 (2H, t,
 $J=6.5\text{Hz}$), 4.45 (2H, dt, $J=47.5$ and 6.5Hz), 6.9-8.3
(14H, m)

30 APCI-MASS : m/z = 460 ($M^+ + 1$)

Preparation 234

1-(E)-[3-[4-[4-(6-Methoxyhexyloxy)phenyl]phenyl]-
acryloyl]benzotriazole 3-oxide

35 NMR (DMSO- d_6 , δ) : 1.30-1.65 (6H, m), 1.65-1.90 (2H,
m), 3.22 (3H, s), 3.22-3.40 (2H, m), 4.02 (2H, t,

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J=6.5Hz), 6.5-8.3 (14H, m)

Preparation 235

5 1-[4-[3-(4-n-Hexyloxyphenyl)pyrazol-5-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 2935, 1780, 1610, 1506 1249, 1232, 1178,
1087 cm⁻¹

10 NMR (CDCl₃, δ) : 0.91 (3H, d, J=6.4Hz), 1.2-1.6 (6H, m), 1.7-1.9 (2H, m), 3.98 (2H, t, J=6.5Hz), 6.8-7.0 (3H, m), 7.4-7.6 (5H, m), 8.00 (2H, d, J=8.4Hz), 8.10 (1H, d, J=8.1Hz), 8.28 (1H, d, J=8.4Hz)

APCI-MASS : m/z = 482 (M+H⁺)

Preparation 236

15 1-[4-[4-[4-(6-Methoxyhexyloxy)phenyl]phenyl]benzoyl]-benzotriazole 3-oxide

IR (KBr) : 2935, 2858, 1774, 1600, 1490, 1257,
1211 cm⁻¹

20 NMR (CDCl₃, δ) : 1.4-1.9 (8H, m), 3.35 (3H, s), 3.40 (2H, t, J=6.3Hz), 4.02 (2H, t, J=6.4Hz), 7.00 (2H, d, J=8.7Hz), 7.4-7.8 (7H, m), 7.87 (2H, d, J=8.4Hz), 8.12 (1H, d, J=8.2Hz), 8.36 (2H, d, J=8.4Hz)

APCI-MASS : m/z = 522 (M+H⁺)

Preparation 237

25 1-[4-[5-[4-(8-Methoxyoctyloxy)phenyl]-1,3,4-thiadiazol-2-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 2929, 2854, 1776, 1602, 1469, 1255 cm⁻¹

30 NMR (CDCl₃, δ) : 1.2-1.6 (10H, m), 1.7-1.9 (2H, m), 3.33 (3H, s), 3.37 (2H, d, J=6.4Hz), 4.03 (2H, d, J=6.5Hz), 7.00 (2H, d, J=8.9Hz), 7.4-7.6 (3H, m), 7.97 (2H, d, J=8.9Hz), 8.12 (1H, d, J=8.2Hz), 8.23 (2H, d, J=8.7Hz), 8.39 (2H, d, J=8.7Hz)

35 APCI-MASS : m/z = 558 (M+H⁺)

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Preparation 238

1-[4-(4-n-Butoxyphenyl)cinnamoyl]benzotriazole 3-oxide

IR (KBr) : 2952, 2867, 1778, 1598, 1496, 1249,
1186 cm^{-1}

5 NMR (CDCl_3 , δ) : 0.99 (3H, t, $J=7.3\text{Hz}$), 1.55 (2H, tq,
 $J=7.0$ and 7.3Hz), 1.78 (2H, tt, $J=7.0$ and 6.4Hz),
4.02 (2H, t, $J=6.4\text{Hz}$), 6.75 (1H, d, $J=16.0\text{Hz}$), 7.00
(2H, d, $J=8.7\text{Hz}$), 7.4-8.2 (9H, m)

APCI-MASS : $m/z = 414$ ($M+H^+$)

10

Preparation 239

1-[4-[5-(4-Cyclohexylphenyl)-1,3,4-thiadiazol-2-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 2925, 2850, 1778, 1230, 989 cm^{-1}

15 NMR (CDCl_3 , δ) : 1.2-1.6 (5H, m), 1.7-2.0 (5H, m),
2.5-2.7 (1H, m), 7.37 (2H, d, $J=8.3\text{Hz}$), 7.4-7.6
(3H, m), 7.97 (2H, d, $J=8.3\text{Hz}$), 8.13 (1H, d,
 $J=8.2\text{Hz}$), 8.26 (2H, d, $J=8.6\text{Hz}$), 8.42 (2H, d,
 $J=8.6\text{Hz}$)

20 APCI-MASS : $m/z = 482$ ($M+H$)⁺

Preparation 240

1-[4-[5-[4-(4-n-Propyloxyphenyl)phenyl]-1,3,4-oxadiazol-2-yl]benzoyl]benzotriazole 3-oxide

25 IR (KBr) : 1778, 1604, 1488, 1249, 1232, 998 cm^{-1}

NMR (CDCl_3 , δ) : 1.07 (3H, t, $J=7.4\text{Hz}$), 1.85 (2H, tq,
 $J=6.5$ and 7.4Hz), 7.02 (2H, d, $J=8.8\text{Hz}$), 7.4-7.7
(3H, m), 7.61 (2H, d, $J=8.8\text{Hz}$), 7.75 (2H, d,
 $J=8.5\text{Hz}$), 8.14 (1H, d, $J=8.2\text{Hz}$), 8.22 (2H, d,
30 $J=8.5\text{Hz}$), 8.40 (2H, d, $J=8.8\text{Hz}$), 8.48 (2H, d,
 $J=8.8\text{Hz}$)

APCI-MASS : $m/z = 518$ ($M+H$)⁺Preparation 241

35 1-[4-(5-n-Nonyl-1,3,4-oxadiazol-2-yl)benzoyl]-

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benzotriazole 3-oxide

IR (KBr) : 2919, 2850, 1780, 1565, 1415, 1251 cm^{-1}

NMR (CDCl_3 , δ) : 0.89 (3H, t, $J=6.7\text{Hz}$), 1.2-1.6 (12H, m), 1.8-2.0 (2H, m), 2.98 (2H, t, $J=7.7\text{Hz}$), 7.4-7.6 (3H, m), 8.12 (1H, d, $J=9.0\text{Hz}$), 8.28 (2H, d, $J=8.7\text{Hz}$), 8.42 (2H, d, $J=8.7\text{Hz}$)

APCI-MASS : $m/z = 434$ ($M+H^+$)Preparation 242

10 1-[4-[3-(4-n-Hexyloxyphenyl)-1,2,4-oxadiazol-5-yl]-benzoyl]benzotriazole 3-oxide

IR (KBr) : 2946, 2869, 1780, 1251, 1230, 1001 cm^{-1}

15 NMR (CDCl_3 , δ) : 0.92 (3H, t, $J=6.8\text{Hz}$), 1.3-1.6 (6H, m), 1.8-1.9 (2H, m), 4.04 (2H, t, $J=6.5\text{Hz}$), 7.03 (2H, d, $J=8.9\text{Hz}$), 7.4-7.6 (3H, m), 8.0-8.2 (3H, m), 8.46 (4H, s)

APCI-MASS : $m/z = 484$ ($M+H^+$)Preparation 243

20 1-[4-[5-(4-n-Octyloxyphenyl)-1,3,4-thiadiazol-2-yl]-benzoyl]benzotriazole 3-oxide

IR (KBr) : 2925, 2856, 1774, 1602, 1259, 1232, 989 cm^{-1}

25 NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.7\text{Hz}$), 1.1-1.6 (10H, m), 1.7-1.9 (2H, m), 4.04 (2H, t, $J=6.5\text{Hz}$), 7.01 (2H, d, $J=8.9\text{Hz}$), 7.4-7.6 (3H, m), 7.97 (2H, d, $J=8.8\text{Hz}$), 8.12 (1H, d, $J=8.2\text{Hz}$), 8.24 (2H, d, $J=8.6\text{Hz}$), 8.40 (2H, d, $J=8.6\text{Hz}$)

APCI-MASS : $m/z = 528$ ($M+H^+$)

30 Preparation 244

1-[4-[5-(4-Trans-n-pentylcyclohexyl)-1,3,4-thiadiazol-2-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 2952, 2919, 2848, 1785, 1444, 1226, 991 cm^{-1}

35 NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.9\text{Hz}$), 1.0-1.7 (13H, m), 1.94 (2H, d, $J=12.0\text{Hz}$), 2.27 (2H, d, $J=12.0\text{Hz}$),

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3.19 (1H, tt, J=12.0 and 3.6Hz), 7.4-7.6 (3H, m),
8.12 (1H, d, J=8.0Hz), 8.19 (2H, d, J=8.6Hz), 8.38
(2H, d, J=8.6Hz)

APCI-MASS : m/z = 476 (M+H⁺)

5

Preparation 245

1-[4-[3-(4-n-Pentyloxyphenyl)isoxazol-5-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 2948, 2867, 1776, 1610, 1436, 1253, 1002 cm⁻¹

10 NMR (CDCl₃, δ) : 0.95 (3H, t, J=7.1Hz), 1.2-1.6 (4H, m), 1.7-1.9 (2H, m), 4.02 (2H, t, J=6.5Hz), 7.0-7.1 (3H, m), 7.4-7.6 (3H, m), 7.81 (2H, d, J=8.8Hz), 8.06 (2H, d, J=8.6Hz), 8.12 (1H, d, J=8.0Hz), 8.39 (2H, d, J=8.6Hz)

15 APCI-MASS : m/z = 469 (M+H⁺)

Preparation 246

1-[4-[5-[4-(8-Methoxyoctyloxy)phenyl]-1,3,4-oxadiazol-2-yl]benzoyl]benzotriazole 3-oxide

20 IR (KBr) : 2923, 2854, 1787, 1608, 1494, 1255, 1228, 993 cm⁻¹

NMR (CDCl₃, δ) : 1.2-1.6 (10H, m), 1.7-1.9 (2H, m), 3.34 (3H, s), 3.38 (2H, t, J=6.4Hz), 4.05 (2H, t, J=6.5Hz), 7.04 (2H, d, J=8.8Hz), 7.4-7.6 (3H, s), 25 8.1-8.2 (3H, s), 8.36 (2H, d, J=8.7Hz), 8.45 (2H, d, J=8.7Hz)

APCI-MASS : m/z = 542 (M+H⁺)

Preparation 247

30 1-[4-[4-(6-Phenylpyridazin-3-yl-oxy)phenyl]benzoyl]-benzotriazole 3-oxide

IR (KBr) : 1783, 1604, 1423, 1284, 985 cm⁻¹

NMR (CDCl₃, δ) : 7.2-8.2 (15H, m), 8.12 (2H, d, J=8.3Hz), 8.36 (2H, d, J=8.4Hz)

35 APCI-MASS : m/z = 486 (M⁺+1)

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Preparation 248

1-[4-[5-(4-n-Octyloxyphenyl)-1,3,4-oxadiazol-2-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 2925, 2854, 1780, 1610, 1496, 1257, 1228,
1180 cm^{-1}

NMR (CDCl_3 , δ) : 0.89 (3H, t, $J=6.8\text{Hz}$), 1.2-2.0 (12H, m), 4.05 (2H, t, $J=6.5\text{Hz}$), 7.05 (2H, d, $J=8.7\text{Hz}$), 7.4-7.6 (3H, m), 8.0-8.2 (3H, m), 8.37 (2H, d, $J=8.6\text{Hz}$), 8.45 (2H, d, $J=8.6\text{Hz}$)

APCI-MASS : $m/z = 512$ ($M+H^+$)

Preparation 249

1-[4-[2-(4-n-Hexyloxyphenyl)pyrimidin-6-yl]benzoyl]-benzotriazole 3-oxide

IR (KBr) : 2948, 2861, 1780, 1552, 1413, 1378, 987 cm^{-1}

NMR (CDCl_3 , δ) : 0.92 (3H, t, $J=6.8\text{Hz}$), 1.2-1.6 (6H, m), 1.8-2.0 (2H, m), 4.06 (2H, t, $J=6.5\text{Hz}$), 7.04 (2H, d, $J=9.0\text{Hz}$), 7.4-7.6 (3H, m), 7.64 (1H, d, $J=5.2\text{Hz}$), 8.13 (1H, d, $J=8.2\text{Hz}$), 8.44 (4H, s), 8.55 (2H, d, $J=9.0\text{Hz}$), 8.90 (1H, d, $J=5.2\text{Hz}$)

APCI-MASS : $m/z = 494$ ($M+H^+$)

Preparation 250

1-[4-[4-[8-(2-Ethoxyethoxy)octyloxy]phenyl]benzoyl]-benzotriazole 3-oxide

IR (KBr) : 2933, 2861, 1778, 1598, 1247, 1186, 977 cm^{-1}

NMR (CDCl_3 , δ) : 1.22 (3H, t, $J=7.0\text{Hz}$), 1.3-2.0 (14H, m), 3.4-3.6 (6H, m), 4.02 (2H, t, $J=6.5\text{Hz}$), 7.02 (2H, d, $J=8.8\text{Hz}$), 7.4-7.6 (3H, m), 7.62 (2H, d, $J=8.8\text{Hz}$), 7.78 (2H, d, $J=8.6\text{Hz}$), 8.10 (1H, d, $J=8.9\text{Hz}$), 8.31 (2H, d, $J=8.6\text{Hz}$)

APCI-MASS : $m/z = 532$ ($M+H^+$)

Preparation 251

1-[4-[4-[7-(Piperidin-1-yl-carbonyl)heptyloxy]phenyl]-

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benzoyl]benzotriazole 3-oxide

IR (KBr) : 2935, 2856, 1774, 1631, 1598, 1255,
1191 cm^{-1}

5 NMR (CDCl_3 , δ) : 1.3-2.0 (16H, m), 2.37 (2H, t,
J=7.6Hz), 3.48 (4H, s), 4.02 (2H, t, J=6.4Hz), 7.02
(2H, d, J=8.6Hz), 7.4-7.6 (3H, m), 7.63 (2H, d,
J=8.6Hz), 7.78 (2H, d, J=8.3Hz), 8.11 (1H, d,
J=8.1Hz), 8.31 (2H, d, J=8.3Hz)

APCI-MASS : m/z = 541 ($\text{M}+\text{H}^+$)

10

Preparation 252

1-[6-[4-(4-n-Heptyloxyphenyl)piperazin-1-yl]nicotinoyl]-
benzotriazole 3-oxide

IR (KBr) : 2929, 2856, 1762, 1604, 1510, 1240 cm^{-1}

15 NMR (CDCl_3 , δ) : 0.89 (3H, t, J=6.7Hz), 1.2-1.9 (10H,
m), 3.20 (4H, t, J=5.0Hz), 3.8-4.0 (6H, m), 6.75
(1H, d, J=9.5Hz), 6.86 (2H, d, J=9.3Hz), 6.95 (2H,
d, J=9.3Hz), 7.3-7.6 (3H, m), 8.10 (1H, d,
J=8.2Hz), 8.19 (1H, dd, J=9.2 and 2.3Hz), 9.05 (1H,
20 d, J=2.3Hz)

APCI-MASS : m/z = 515 ($\text{M}+\text{H}^+$)

Preparation 253

1-[6-[4-[4-(8-Methoxyoctyloxy)phenyl]piperazin-1-
25 yl]nicotinoyl]benzotriazole 3-oxide

IR (KBr) : 2929, 2854, 1766, 1602, 1510, 1419,
1234 cm^{-1}

30 NMR (CDCl_3 , δ) : 1.3-1.9 (12H, m), 3.2-3.3 (4H, m),
3.33 (3H, s), 3.36 (2H, t, J=6.4Hz), 3.92 (2H, t,
J=6.5Hz), 4.0-4.2 (4H, m), 6.75 (1H, d, J=9.1Hz),
6.87 (2H, d, J=8.9Hz), 7.0-7.2 (2H, m), 7.4-7.6
(3H, m), 8.09 (1H, d, J=8.1Hz), 8.20 (1H, dd, J=9.1
and 2.3Hz), 9.05 (1H, d, J=2.3Hz)

APCI-MASS : m/z = 559 ($\text{M}+\text{H}^+$)

35

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Preparation 254

1-[4-[5-[4-(4-n-Propyloxyphenyl)phenyl]-1,3,4-thiadiazol-2-yl]benzoyl]benzotriazole 3-oxide

IR (KBr) : 1774, 1600, 1234, 985 cm^{-1}

5 NMR (CDCl_3 , δ) : 1.07 (3H, t, $J=7.3\text{Hz}$), 1.85 (2H, tq, $J=6.5$ and 7.3Hz), 3.99 (2H, t, $J=6.5\text{Hz}$), 7.01 (2H, d, $J=8.7\text{Hz}$), 7.4-7.7 (5H, m), 7.72 (2H, d, $J=8.7\text{Hz}$), 8.1-8.2 (2H, m), 8.28 (2H, d, $J=8.6\text{Hz}$), 8.44 (2H, d, $J=8.6\text{Hz}$)

10 APCI-MASS : $m/z = 534 (M+H)^+$

The following compounds (Preparations 255 to 256) were obtained according to a similar manner to that of Preparation 32.

15

Preparation 255

6-Heptylnaphthalene-2-carboxylic acid

20 NMR (CDCl_3 , δ) : 0.88 (3H, t, $J=6.6\text{Hz}$), 1.15-1.53 (8H, m), 1.58-1.88 (2H, m), 2.80 (2H, t, $J=7.6\text{Hz}$), 7.42 (1H, dd, $J=1.7$ and 8.4Hz), 7.67 (1H, s), 7.84 (1H, d, $J=8.6\text{Hz}$), 7.90 (1H, d, $J=8.4\text{Hz}$), 8.09 (1H, dd, $J=1.7$ and 8.6Hz), 8.68 (1H, s)

APCI-MASS : $m/z = 271 (M^++1)$, 285 (methyl ester $^+-1$)

25 Preparation 256

3-(E)-[4-[4-(7-Fluoroheptyloxy)phenyl]phenyl]acrylic acid

IR (KBr) : 3037.3, 2935.1, 2861.8, 1679.7, 1633.4, 1600.6 cm^{-1}

30 NMR ($\text{DMSO}-d_6$, δ) : 1.30-1.85 (10H, m), 4.01 (2H, t, $J=6.4\text{Hz}$), 4.44 (2H, dt, $J=47.6$ and 6.1Hz), 6.54 (1H, d, $J=15.9\text{Hz}$), 7.02 (2H, d, $J=8.7\text{Hz}$), 7.53-7.80 (7H, m)

35 Preparation 257

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To a solution of 4-methylpentanol (3.0 ml) in pyridine (20 ml) were added in turn with p-toluenesulfonyl chloride (4.6 g) and 4-N,N-dimethylaminopyridine (1.5 g) at ambient temperature. After stirring at ambient temperature, the reaction mixture was taken up into a mixture of ethyl acetate (100 ml) and water (100 ml). The separated organic layer was washed in turn with hydrochloric acid(1N), water, aqueous sodium hydrogencarbonate, and brine, and dried over magnesium sulfate. Evaporation gave 1-p-Toluenesulfonyloxy-4-methylpentane (5.30 g).

NMR (CDCl₃, δ) : 0.83 (6H, d, J=6.6Hz), 1.48 (1H, sept, J=6.6Hz), 1.50-1.70 (2H, m), 2.45 (3H, s), 4.00 (2H, t, J=6.6Hz), 7.34 (2H, d, J=8.1Hz), 7.79 (2H, d, J=8.1Hz)

APCI-MASS : m/z = 257 (M⁺+1)

Preparation 258

To a solution of 4-bromo-4'-n-butyloxybiphenyl (3.05 g) in tetrahydrofuran (60 ml) was added 1.55M n-butyllithium in n-hexane (7.74 ml) at -60°C over a period of 10 minutes. The solution was stirred at -30°C for 1.5 hours and cooled to -60°C. To the solution was added triisopropylborate (3.46 ml) over a period of 5 minutes, and the mixture was stirred for 1.5 hours without cooling. To the solution was added 1N hydrochloric acid (20 ml) and the solution was stirred for 30 minutes and extracted with ethyl acetate. The organic layer was separated and washed with water, brine and dried over magnesium sulfate. The solvents were removed under reduced pressure and the residue was triturated with n-hexane. The solid was collected by filtration and dried under reduced pressure to give 4-(4-n-Butyloxyphenyl)phenylboronic acid (2.31 g).

IR (KBr) : 3398, 2956, 2919, 2871, 1604, 1531, 1392, 1257 cm⁻¹

NMR (DMSO-d₆, δ) : 0.94 (3H, t, J=7.3Hz), 1.4-1.8 (4H,

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m), 4.01 (2H, t, J=6.3Hz), 7.01 (2H, d, J=8.7Hz),
7.58 (2H, d, J=7.9Hz), 7.62 (2H, d, J=8.7Hz), 7.84
(2H, d, J=7.9Hz), 8.03 (2H, s)

5 The following compounds (Preparations 259 to 260) were
obtained according to a similar manner to that of Preparation
258.

Preparation 259

10 4-[4-(6-Methoxyhexyloxy)phenyl]phenylboronic acid
IR (KBr) : 3448, 3392, 2937, 2861, 1606, 1529, 1346,
1288 cm^{-1}
NMR (DMSO- d_6 , δ) : 1.3-1.8 (8H, m), 3.21 (3H, s), 3.31
(2H, t, J=6.3Hz), 3.99 (2H, t, J=6.4Hz), 7.00 (2H,
15 d, J=8.7Hz), 7.5-7.7 (4H, m), 7.84 (2H, d,
J=8.1Hz), 8.03 (2H, s)
APCI-MASS : m/z = 329 ($M+H^+$)

Preparation 260

20 4-[4-(5-Methoxypentyloxy)phenyl]phenylboronic acid
IR (KBr) : 3473, 3369, 3330, 2935, 2863, 1604, 1531,
1338, 1251 cm^{-1}
NMR (DMSO- d_6 , δ) : 1.4-1.8 (6H, m), 3.22 (3H, s), 3.3-
3.4 (2H, m), 3.99 (2H, t, J=6.4Hz), 7.00 (2H, d,
25 J=8.7Hz), 7.58 (2H, d, J=8.0Hz), 7.61 (2H, d,
J=8.7Hz), 7.84 (2H, d, J=8.0Hz), 8.04 (2H, s)
APCI-MASS : m/z = 315 ($M+H^+$)

Preparation 261

30 To a suspension of 4-Methoxycarbonylphenyl boronic acid
(648 mg) and 4-iodo-1-heptylpyrazole (876 mg) and $\text{Pd}(\text{PPh}_3)_4$
(173 mg) in 1,2-dimethoxyethane (10 ml) was added 2M Na_2CO_3
aq. (3.6 ml). The reaction mixture was stirred at 80°C for 2
hours under N_2 atmosphere, and poured into ice-water and
35 extracted with ethyl acetate. The organic layer was washed

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with brine, and dried over MgSO_4 . The solvent was removed under pressure. The residue was subjected to column-chromatography on silica gel 60 (Merk) and eluted with n-hexane/ethyl acetate (80:20). The fractions containing the object compound were combined and evaporated under reduced pressure to give 1-heptyl-4-(4-methoxycarbonylphenyl)pyrazole (0.20 g).

IR (KBr pelet) : 2952, 2920, 2848, 1712, 1610, 1288, 1114, 769 cm^{-1}

NMR (DMSO-d_6 , δ) : 0.85 (3H, t, $J=6.7\text{Hz}$), 1.1-1.4 (8H, m), 1.7-1.9 (2H, m), 3.85 (3H, s), 4.11 (2H, t, $J=7.0\text{Hz}$), 7.72 (2H, d, $J=8.5\text{Hz}$), 7.93 (2H, d, $J=8.5\text{Hz}$), 7.99 (1H, s), 8.34 (1H, s)

APCI-MASS : $m/z = 301$ ($\text{M}+\text{H}^+$)

The following compounds (Preparations 262 to 268) were obtained according to a similar manner to that of Preparation 261.

Preparation 262

Ethyl 4-[4-(4-n-butyloxyphenyl)phenyl]benzoate

IR (KBr) : 2958, 2935, 2871, 1714, 1602, 1396, 1280, 1108 cm^{-1}

NMR (CDCl_3 , δ) : 0.99 (3H, t, $J=7.3\text{Hz}$), 1.4-2.0 (7H, m), 4.02 (2H, t, $J=6.4\text{Hz}$), 4.40 (2H, q, $J=7.1\text{Hz}$), 6.98 (2H, d, $J=6.8\text{Hz}$), 7.56 (2H, d, $J=6.8\text{Hz}$), 7.66 (4H, s), 7.68 (2H, d, $J=8.4\text{Hz}$), 8.12 (2H, d, $J=8.4\text{Hz}$)

APCI-MASS : $m/z = 375$ ($\text{M}+\text{H}^+$)

Preparation 263

Methyl 6-(4-heptyloxyphenyl)nicotinate

IR (KBr) : 2954, 2859, 1724, 1597, 1288, 1251, 1116, 783 cm^{-1}

NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.6\text{Hz}$), 1.2-1.5 (8H,

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m), 1.7-1.9 (2H, m), 3.96 (3H, s), 4.03 (2H, t, J=6.5Hz), 7.00 (2H, d, J=8.8Hz), 7.75 (1H, d, J=8.4Hz), 8.02 (1H, d, J=8.8Hz), 8.30 (1H, dd, J=8.4 and 2.2Hz), 9.23 (1H, d, J=2.2Hz)

5 APCI-MASS : m/z = 328 (M+H⁺)

Preparation 264

Methyl 6-[4-(4-n-butyloxyphenyl)phenyl]nicotinate

10 IR (KBr) : 2956, 2933, 2871, 1724, 1598, 1282,
1118 cm⁻¹

NMR (CDCl₃, δ) : 1.00 (3H, t, J=7.3Hz), 1.4-1.9 (4H, m), 3.98 (3H, s), 4.02 (2H, t, J=6.4Hz), 7.00 (2H, d, J=8.8Hz), 7.59 (2H, d, J=8.8Hz), 7.70 (2H, d, J=8.5Hz), 7.86 (1H, d, J=8.8Hz), 8.13 (2H, d, J=8.5Hz), 8.37 (1H, dd, J=8.8 and 1.6Hz), 9.30 (1H, d, J=1.6Hz)

15 APCI-MASS : m/z = 362 (M+H⁺)

Preparation 265

20 Methyl 5-[4-(4-n-butyloxyphenyl)phenyl]furan 2-carboxylate

IR (KBr) : 2958, 2933, 2873, 1716, 1483, 1303,
1139 cm⁻¹

25 NMR (CDCl₃, δ) : 0.99 (3H, t, J=7.3Hz), 1.5-1.9 (4H, m), 3.93 (3H, s), 4.01 (2H, t, J=6.4Hz), 6.75 (1H, d, J=3.6Hz), 6.98 (2H, d, J=8.7Hz), 7.26 (1H, d, J=3.6Hz), 7.56 (2H, d, J=8.4Hz), 7.61 (2H, d, J=8.7Hz), 7.83 (2H, d, J=8.4Hz)

30 APCI-MASS : m/z = 351 (M+H)⁺

Preparation 266

Ethyl 4-[4-[4-(6-methoxyhexyloxy)phenyl]phenyl]benzoate

IR (KBr) : 2937, 2863, 1712, 1602, 1396, 1278,
1108 cm⁻¹

35 NMR (CDCl₃, δ) : 1.4-2.0 (11H, m), 3.34 (3H, s), 3.39

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(2H, t, J=6.4Hz), 4.01 (2H, t, J=6.4Hz), 4.41 (2H, q, J=7.1Hz), 6.98 (2H, d, J=8.7Hz), 7.56 (2H, d, J=8.7Hz), 7.6-7.8 (6H, m), 8.12 (2H, d, J=8.4Hz)

APCI-MASS : m/z = 433 (M+H⁺)

5

Preparation 267

4-[4-[4-(5-Methoxypentyloxy)phenyl]phenyl]benzoic acid

IR (KBr) : 2939, 2859, 1679, 1587, 1396, 1321, 1292, 1126 cm⁻¹

10 NMR (DMSO-d₆, δ) : 1.3-1.8 (6H, m), 3.21 (3H, s), 3.2-3.4 (2H, m), 4.01 (2H, t, J=6.5Hz), 7.04 (2H, d, J=8.6Hz), 7.66 (2H, d, J=8.6Hz), 7.7-7.9 (6H, m), 8.03 (2H, d, J=8.2Hz)

APCI-MASS : m/z = 391 (M+H⁺)

15

Preparation 268

Methyl 4-[4-[4-(5-methoxypentyloxy)phenyl]phenyl]phenyl acetate

IR (KBr) : 2937, 2863, 1739, 1604, 1492, 1255 cm⁻¹

20 NMR (CDCl₃, δ) : 1.5-2.0 (6H, m), 3.34 (3H, s), 3.42 (2H, t, J=6.3Hz), 3.68 (2H, s), 3.72 (3H, s), 4.02 (2H, t, J=6.4Hz), 6.97 (2H, d, J=8.7Hz), 7.36 (2H, d, J=8.2Hz), 7.5-7.7 (8H, m)

APCI-MASS : m/z = 419 (M+H⁺)

25

Preparation 269

A solution of 3-[2-(4-Hexylphenylamino)ethyl]-2-oxo-oxazolidine hydrochloride (2.131 g) in 25% hydrobromic acid in acetic acid (13.04 ml) was stirred for 96 hours at ambient
30 temperature. The reaction mixture was pulverized with diisopropyl ether. The precipitate was collected by filtration and added to ethanol (15 ml). The solution was refluxed for 5 hours and pulverized with diisopropyl ether. The precipitate was collected by filtration to give 1-(4-n-
35 Hexylphenyl)piperazine dihydrobromide (2.413 g).

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IR (KBr) : 2921.6, 2711.4, 2485.8, 1452.1, 1012.4 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.85 (3H, t, $J=6.6\text{Hz}$), 1.1-1.4 (6H, m), 1.4-1.6 (2H, m), 2.49 (2H, t, $J=8.4\text{Hz}$), 3.1-3.4 (8H, m), 6.54 (2H, s), 6.90 (2H, d, $J=8.7\text{Hz}$), 7.08 (2H, d, $J=8.7\text{Hz}$), 8.78 (1H, s)

APCI-MASS : $m/z = 247$ ($\text{M}^+ + \text{H}$)

The following compounds (Preparations 270 to 274) were obtained according to a similar manner to that of Preparation 269.

Preparation 270

4-[4-(4-n-Hexylphenyl)piperazin-1-yl]benzoic acid dihydrobromide

IR (KBr) : 2956.3, 1691.3, 1664.3, 1602.6, 1232.3 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.85 (3H, t, $J=6.5\text{Hz}$), 1.2-1.4 (10H, m), 1.4-1.6 (2H, m), 2.51 (2H, t, $J=7.4\text{Hz}$), 3.2-3.6 (8H, m), 7.0-7.2 (6H, m), 7.81 (2H, d, $J=8.8\text{Hz}$)

APCI-MASS : $m/z = 367$ ($\text{M}^+ + \text{H}$)

Preparation 271

1-(4-Cyclohexylphenyl)piperazine dihydrobromide

IR (KBr) : 2927.4, 1510.0, 1452.1 cm^{-1}

NMR (DMSO- d_6 , δ) : 1.1-1.5 (6H, m), 1.6-1.9 (4H, m), 2.41 (1H, m), 3.1-3.4 (8H, m), 6.91 (2H, d, $J=8.7\text{Hz}$), 7.11 (2H, d, $J=8.7\text{Hz}$), 8.78 (1H, s)

APCI-MASS : $m/z = 245$ ($\text{M}^+ + \text{H}$)

Preparation 272

4-[4-(4-Cyclohexylphenyl)piperazin-1-yl]benzoic acid dihydrobromide

IR (KBr) : 1668.1, 1602.6, 1230.4, 1189.9 cm^{-1}

APCI-MASS : $m/z = 365$ ($\text{M}^+ + \text{H}$)

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Preparation 273

3-Fluoro-4-[4-(4-hydroxyphenyl)piperazin-1-yl]benzoic acid dihydrobromide

IR (KBr) : 1708.6, 1610.3 cm^{-1}

5 NMR (DMSO- d_6 , δ) : 3.2-3.6 (8H, m), 6.81 (2H, d, $J=8.6\text{Hz}$), 7.0-7.4^e (3H, m), 7.4-7.8 (2H, m)

APCI-MASS : m/z = 317 ($\text{M}^+ + \text{H}$)

Preparation 274

10 4-[4-(4-Hydroxyphenyl)piperazin-1-yl]benzoic acid dihydrobromide

IR (KBr) : 1670.1, 1604.5, 1226.5, 775.2 cm^{-1}

15 NMR (DMSO- d_6 , δ) : 3.0-3.2 (4H, m), 3.3-3.5 (4H, m), 6.68 (2H, d, $J=8.8\text{Hz}$), 6.85 (2H, d, $J=8.8\text{Hz}$), 7.02 (2H, d, $J=8.8\text{Hz}$), 7.79 (2H, d, $J=8.8\text{Hz}$), 8.86 (1H, s), 12.29 (1H, s)

APCI-MASS : m/z = 299 ($\text{M} + \text{H}^+$)

Preparation 275

20 A mixture of 4-n-hexyloxyaniline (10 g), ethyl acrylate (56.1 ml), glacial acetic acid (19.25 ml), and cuprous chloride (1.02 g) was heated under reflux with stirring under nitrogen for 26 hours. A solution of the cold product in ether was shaken with water and then with aqueous ammonia.

25 The organic layer was taken and dried over magnesium sulfate. The magnesium sulfate was filtered off, and filtrate was evaporated under reduced pressure. The residue was subjected to column chromatography on silica gel and eluted with hexane - ethyl acetate (9:1). The fractions containing the

30 object compound were combined and evaporated under reduced pressure to give Ethyl 3-[N-(2-ethoxycarbonyl)ethyl]-N-(4-hexyloxyphenyl)amino]propionate (15.756 g).

IR (Neat) : 1733.7, 1513.8, 1241.9, 1182.2 cm^{-1}

35 NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.5\text{Hz}$), 1.2-1.55 (6H, m), 1.24 (6H, t, $J=7.1\text{Hz}$), 1.65-1.85 (2H, m), 2.51

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(4H, t, J=7.2Hz), 3.53 (4H, t, J=7.2Hz), 3.89 (2H, t, J=6.5Hz), 4.12 (4H, q, J=7.1Hz), 6.72 (2H, d, J=9.3Hz), 6.83 (2H, d, J=9.3Hz)

APCI-MASS : m/z = 394 (M⁺+H)

5

Preparation 276

A suspension of methyl 4-formylbenzoate (4.92 g), hydroxylamine hydrochloride (5.21 g) and sodium acetate (6.15 g) in ethanol (50 ml) was refluxed for 2 hours. The mixture was poured into water and extracted with ethyl acetate and the separated organic layer was washed with brine and dried over magnesium sulfate. The solvents were removed under reduced pressure to give 4-methoxycarbonylbenzaldehyde oxime (5.28 g).

15 IR (KBr) : 3291, 1727, 1438, 1284, 1112 cm⁻¹
NMR (CDCl₃, δ) : 3.93 (3H, s), 7.65 (2H, d, J=8.3Hz), 8.10 (2H, d, J=8.3Hz), 8.18 (1H, s), 8.27 (1H, s)
APCI-MASS : m/z = 180

20 The following compound was obtained according to a similar manner to that of Preparation 276.

Preparation 277

N-Hydroxy-4-n-hexyloxybenzamidine

25 IR (KBr) : 3446, 3349, 2937, 2865, 1650, 1610, 1519, 1392, 1253 cm⁻¹
NMR (DMSO-d₆, δ) : 0.88 (3H, t, J=6.4Hz), 1.2-1.8 (8H, m), 3.97 (2H, t, J=6.5Hz), 5.70 (2H, s), 6.90 (2H, d, J=8.4Hz), 7.58 (2H, d, J=8.4Hz), 9.43 (1H, s)
30 APCI-MASS : m/z = 237 (M+H)⁺

Preparation 278

To a solution of 4-methoxycarbonylbenzaldehyde oxime (896 mg) in N,N-dimethylformamide (10 ml) was added 4N-hydrochloride acid in 1,4-dioxane (1.38 ml) and oxone^R (1.69

35

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g). The suspension was stirred at ambient temperature for 16 hours and poured into ice-water. The object compound was extracted with ethyl acetate and the organic layer was washed with brine, dried over magnesium sulfate. The solvents were removed under reduced pressure to give
5 4-Methoxycarbonylbenzaldehyde oxime chloride (1.05 g).

IR (KBr) : 3390, 1710, 1436, 1405, 1284, 1232, 1116,
1016 cm^{-1}

NMR (CDCl_3 , δ) : 3.95 (3H, s), 8.93 (2H, d, $J=8.3\text{Hz}$),
10 8.10 (2H, d, $J=8.7\text{Hz}$), 8.39 (1H, s)

APCI-MASS : m/z = 176 ($\text{M}-\text{H}^+-\text{HCl}$)

Preparation 279

A solution of Ethyl 4-oxo-1-(4-n-
15 hexyloxyphenyl)piperidine-3-carboxylate (1.437 g) in 20% hydrochloric acid (7.2 ml) was refluxed for 2 hours, cooled, basified with 60% aqueous sodium hydroxide, and extracted with ethyl acetate. The organic layer was taken and dried over magnesium sulfate. The magnesium sulfate was filtered
20 off, and filtrate was evaporated under reduced pressure to give 1-(4-n-Hexyloxyphenyl)-4-piperidone (0.959 g).

IR (Neat) : 2931.3, 1716.3, 1511.9, 1243.9, 825.4 cm^{-1}

NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.5\text{Hz}$), 1.2-1.6 (6H, m), 1.65-1.85 (2H, m), 2.57 (4H, t, $J=6.1\text{Hz}$), 3.46
25 (4H, t, $J=6.1\text{Hz}$), 3.92 (2H, t, $J=6.5\text{Hz}$), 6.85 (2H, d, $J=9.3\text{Hz}$), 6.95 (2H, d, $J=9.3\text{Hz}$)

APCI-MASS : m/z = 276 (M^++H)

Preparation 280

30 A solution of 4-[4-(7-Bromoheptyloxy)phenyl]bromobenzene (0.25 g) in a solution of tetra n-butylammonium fluoride (tetrahydrofuran solution, 1M, 2.9 ml) was heated to 50°C for 2 hours. After cooling to ambient temperature, the solution was taken up into a mixture of ethyl acetate (20 ml) and
35 water (20 ml). The separated organic layer was washed with

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water, brine, and dried over magnesium sulfate. Evaporation gave a residue which was chromatographed on silica gel (30 ml) eluting with a mixture of n-hexane and ethyl acetate (100:0-97:3, V/V). The fractions which contained the objective compound were collected and evaporated a residue which was triturated with n-hexane to give 4-[4-(7-Fluoroheptyloxy)phenyl]bromobenzene (104 mg).

IR (KBr) : 2937.1, 2859.9, 1606.4 cm^{-1}

NMR (CDCl_3 , δ) : 1.20-1.90 (10H, m), 3.99 (2H, t, $J=6.4\text{Hz}$), 4.45 (2H, dt, $J=47.3$ and 6.1Hz), 6.95 (2H, d, $J=6.7\text{Hz}$), 7.40 (2H, d, $J=6.7\text{Hz}$), 7.47 (2H, d, $J=6.7\text{Hz}$), 7.52 (2H, d, $J=6.7\text{Hz}$)

The following compound was obtained according to a similar manner to that of Preparation 280.

Preparation 281

4-[4-(6-Fluorohexyloxy)phenyl]bromobenzene

NMR (CDCl_3 , δ) : 1.40-1.95 (8H, m), 4.01 (2H, t, $J=6.4\text{Hz}$), 4.47 (2H, dt, $J=47.5$ and 6.0Hz), 6.95 (2H, d, $J=8.6\text{Hz}$), 7.35-7.59 (6H, m)

Preparation 282

A solution of 4-[4-(8-Bromooctyloxy)phenyl]bromobenzene (3.7 g) in a mixture of sodium methoxide (4.9M in methanol, 17 ml), N,N-dimethylformamide (20 ml) and tetrahydrofuran (8 ml) was heated to 80°C for 3 hours. The reaction mixture was taken up into a mixture of ethyl acetate (200 ml) and water (100 ml). The separated organic layer was washed in turn with water, brine, dried over magnesium sulfate. Evaporation gave a residue which was subjected to column chromatography (silica gel, 100 ml) eluting with n-hexane to give 4-[4-(8-Methoxyoctyloxy)phenyl]bromobenzene (2.73 g).

IR (KBr) : 2935.1, 2858.0, 1604.5 cm^{-1}

NMR (CDCl_3 , δ) : 1.25-1.70 (10H, m), 1.70-1.95 (2H,

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m), 3.33 (3H, s), 3.37 (2H, t, J=6.5Hz), 3.99 (2H, t, J=6.5Hz), 6.95 (2H, d, J=8.8Hz), 7.35-7.66 (6H, m)

APCI-MASS : m/z = 391 (M⁺)

5

The following compounds (Preparations 283 to 284) were obtained according to a similar manner to that of Preparation 282.

10 Preparation 283

4-[4-(6-Methoxyhexyloxy)phenyl]bromobenzene

NMR (CDCl₃, δ) : 1.50-1.70 (6H, m), 1.70-1.95 (2H, m), 3.34 (3H, s), 3.40 (2H, t, J=6.2Hz), 3.99 (2H, t, J=6.5Hz), 6.95 (2H, d, J=8.7Hz), 7.30-7.60 (6H, m)

15 APCI-MASS : m/z = 365 (M⁺+2)

Preparation 284

4-[4-(7-Methoxyheptyloxy)phenyl]bromobenzene

IR (KBr) : 2935.1, 2854.1, 1604.5 cm⁻¹

20 NMR (CDCl₃, δ) : 1.25-1.70 (8H, m), 1.70-1.95 (2H, m), 3.33 (3H, s), 3.37 (2H, t, J=6.4Hz), 3.98 (2H, t, J=6.5Hz), 6.95 (2H, d, J=8.8Hz), 7.35-7.56 (6H, m)

APCI-MASS : m/z = 379 (M⁺+2)

25 Preparation 285

N-(4-octylphenyl)-N'-aminourea, Formamidine acetate (12.76 g) and N-carbazoyl-4-octylaniline (6.458 g) in N,N-dimethylformamide (19.4 ml) were stirred at 150°C for 6 hours. The reaction mixture was pulverized with water. The precipitate was collected by filtration and washed with water to give 4-(4-Octylphenyl)-2,3-dihydro-4H-1,2,4-triazol-3-one (4.27 g).

IR (KBr) : 3214.8, 3085.5, 1704.8 cm⁻¹

35 NMR (CDCl₃, δ) : 0.88 (3H, t, J=6.7Hz), 1.2-1.5 (10H, m), 1.5-1.8 (2H, m), 2.64 (2H, t, J=7.9Hz), 7.29

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(2H, d, J=8.5Hz), 7.43 (2H, d, J=8.5Hz), 7.67 (1H, d, J=1.3Hz), 10.31 (1H, s)
APCI-MASS : m/z = 274 (M+H⁺)

5 The following compound (Preparation 286) was obtained according to a similar manner to that of Preparation 285.

Preparation 286

10 4-[4-(4-tert-Butoxycarbonylpiperazin-1-yl)phenyl]-2,3-dihydro-4H-1,2,4-triazol-3-one

IR (KBr) : 3200, 1699.0, 918.0 cm⁻¹

NMR (CDCl₃, δ) : 1.49 (9H, s), 3.17 (4H, t, J=4.9Hz), 3.60 (4H, t, J=4.9Hz), 7.00 (2H, d, J=9.0Hz), 7.40 (2H, d, J=9.0Hz), 7.63 (1H, s), 10.4 (1H, s)

15 APCI-MASS : m/z = 346 (M+H⁺)

Preparation 287

20 A mixture of Methyl 6-(1-heptynyl)naphthalene-2-carboxylate (4.51 g) and platinum oxide (0.4 g) in tetrahydrofuran was stirred under 3.5 atm pressure of hydrogen for 5 hours. The catalyst was filtered off and the filtrate was evaporated to give Methyl 6-heptylnaphthalene-2-carboxylate (4.40 g).

25 NMR (CDCl₃, δ) : 0.88 (3H, t, J=6.6Hz), 1.16-1.50 (8H, m), 1.50-1.80 (2H, m), 2.78 (2H, t, J=7.6Hz), 3.97 (3H, s), 7.39 (1H, dd, J=17 and 8.4Hz), 7.64 (1H, s), 7.79 (1H, d, J=8.6Hz), 7.86 (1H, d, J=8.4Hz), 8.02 (1H, dd, J=1.7 and 8.6Hz), 8.57 (1H, s)

APCI-MASS : m/z = 285 (M⁺+1)

30

 The following compound (Preparation 288) was obtained according to a similar manner to that of Preparation 287.

Preparation 288

35 Methyl 6-hexylnaphthalene-2-carboxylate

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NMR (CDCl_3 , δ) : 0.88 (3H, t, $J=6.8\text{Hz}$), 1.17-1.53 (6H, m), 1.60-1.82 (2H, m), 2.79 (2H, t, $J=7.7\text{Hz}$), 3.97 (3H, s), 7.39 (1H, dd, $J=1.7$ and 8.4Hz), 7.64 (1H, s), 7.80 (1H, d, $J=8.6\text{Hz}$), 7.86 (1H, d, $J=8.4\text{Hz}$),
5 8.03 (1H, dd, $J=1.7$ and 8.6Hz), 8.57 (1H, s)
APCI-MASS : $m/z = 271$ ($M+1$)

Preparation 289

To a stirred solution of Methyl 6-hydroxynaphthalene-2-carboxylate (3.0 g) in dichloromethane (40 ml) were added in
10 turn diisopropylethylamine (3.9 ml) and triflic anhydride (3.0 ml) at -40°C . After stirring at -40°C for 20 minutes, the mixture was taken up into a mixture of ethyl acetate and cold water. The organic layer was separated, washed with
15 brine, dried over magnesium sulfate, and dried in vacuo. The residue was taken up into piperidine (20 ml) and to the solution were added 1-heptyne (4.0 ml) and tetrakis(triphenylphosphine)palladium(0) (0.5 g). After heating to 85°C for 1 hour under nitrogen atmosphere, the
20 reaction mixture was evaporated in vacuo. The residue was diluted with ethyl acetate, and the solution was washed in turn with hydrochloric acid and brine, dried over magnesium sulfate and evaporated in vacuo. The residue was
25 chromatographed on silica gel (200 ml) eluting with a mixture of n-hexane and ethyl acetate (9:1, V/V) to give Methyl 6-(1-heptynyl)naphthalene-2-carboxylate (4.01 g).

NMR (CDCl_3 , δ) : 0.94 (3H, t, $J=7.1\text{Hz}$), 1.30-1.70 (6H, m), 2.46 (2H, t, $J=7.0\text{Hz}$), 3.97 (3H, s), 7.50 (1H, dd, $J=1.7$ and 8.6Hz), 7.80 (1H, d, $J=8.6\text{Hz}$), 7.86
30 (1H, d, $J=8.6\text{Hz}$), 8.04 (1H, dd, $J=1.7$ and 8.6Hz), 8.55 (1H, s)
APCI-MASS : $m/z = 281$ (M^++1)

The following compound was obtained according to a
35 similar manner to that of Preparation 289.

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Preparation 290

Methyl 6-(1-hexynyl)naphthalene-2-carboxylate

NMR (CDCl₃, δ) : 0.97 (3H, t, J=7.1Hz), 1.40-1.71 (4H, m), 2.47 (2H, t, J=6.8Hz), 3.98 (3H, s), 7.50 (1H, dd, J=1.5 and 8.5Hz), 7.79 (1H, d, J=8.6Hz), 7.85 (1H, d, J=8.5Hz), 7.92 (1H, s), 8.04 (1H, dd, J=1.7 and 8.6Hz), 8.55 (1H, s)

APCI-MASS : m/z = 267 (M⁺+1)10 Preparation 291

To a solution of 4-octylaniline (5 ml) in a mixture of pyridine (12.5 ml) and chloroform (40 ml) was added phenyl chloroformate (2.95 ml) and stirred for 1.5 hours at ambient temperature. The reaction mixture was added to a mixture of water and ethyl acetate. The organic layer was taken and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure to give 4-Octyl-N-phenoxy-carbonylaniline (4.51 g)

IR (KBr) : 3318.9, 1714.4, 1234.2 cm⁻¹

20 NMR (CDCl₃, δ) : 0.88 (3H, t, J=6.2Hz), 1.2-1.4 (10H, m), 1.5-1.7 (2H, m), 2.57 (2H, t, J=7.3Hz), 6.88 (1H, s), 7.1-7.5 (9H, m)

25 The following compounds (Preparations 292 to 299) were obtained according to a similar manner to that of Preparation 291.

Preparation 292

30 4-(4-tert-Butoxycarbonylpiperazin-1-yl)-N-phenoxy-carbonylaniline

IR (KBr) : 3309.2, 1743.3, 1658.5, 1197.6 cm⁻¹

35 NMR (CDCl₃, δ) : 1.48 (9H, s), 3.08 (4H, t, J=5.3Hz), 3.58 (4H, t, J=5.3Hz), 6.87 (1H, s), 6.91 (2H, d, J=9Hz), 7.1-7.5 (7H, m)

APCI-MASS : m/z = 398 (M+H⁺)

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Preparation 293

1-(4-Cyclohexylbenzoyl)-2-(4-methoxycarbonylbenzoyl)-
hydrazine

IR (KBr) : 3236, 2925, 2852, 1726, 1679, 1637, 1278,
5 1110 cm^{-1}

NMR (DMSO- d_6 , δ) : 1.1-1.5 (5H, m), 1.6-2.0 (5H, m),
2.60 (1H, m), 3.90 (3H, s), 7.37 (2H, d, $J=8.0\text{Hz}$),
7.85 (2H, d, $J=8.0\text{Hz}$), 8.0-8.2 (4H, m), 10.48 (1H,
s), 10.68 (1H, s)

10 APCI-MASS : $m/z = 381$ (M+H) $^{+}$

Preparation 294

1-[4-(Piperidin-1-yl)benzoyl]-2-(4-
methoxycarbonylbenzoyl]hydrazine

15 IR (KBr) : 3500, 3286, 2941, 2854, 1712, 1689, 1650,
1606, 1286, 1242 cm^{-1}

NMR (DMSO- d_6 , δ) : 1.59 (6H, s), 3.33 (4H, s), 3.90
(3H, s), 6.97 (2H, d, $J=8.8\text{Hz}$), 7.79 (2H, d,
 $J=8.8\text{Hz}$), 8.02 (2H, d, $J=8.4\text{Hz}$), 8.09 (2H, d,
20 $J=8.4\text{Hz}$), 10.23 (1H, s), 10.57 (1H, s)

APCI-MASS : $m/z = 382$ (M+H) $^{+}$

Preparation 295

25 1-[4-(4-n-Propyloxyphenyl)benzoyl]-2-(4-
methoxycarbonylbenzoyl]hydrazine

IR (KBr) : 3230, 1724, 1679, 1654, 1280, 1108 cm^{-1}

NMR (DMSO- d_6 , δ) : 1.00 (3H, d, $J=7.5\text{Hz}$), 1.76 (2H, tq,
 $J=6.5$ and 7.5Hz), 3.91 (3H, s), 7.05 (2H, d,
 $J=8.7\text{Hz}$), 7.71 (2H, d, $J=8.7\text{Hz}$), 7.79 (2H, d,
30 $J=8.5\text{Hz}$), 8.00 (2H, d, $J=8.5\text{Hz}$), 8.05 (2H, d,
 $J=8.6\text{Hz}$), 8.11 (2H, d, $J=8.6\text{Hz}$), 10.60 (1H, s),
10.72 (1H, s)

APCI-MASS : $m/z = 433$ (M+H) $^{+}$

35 Preparation 296

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1-(4-Methoxycarbonylbenzoyl)-2-decanoylhydrazine

IR (KBr) : 3220, 2919, 2850, 1724, 1643, 1600, 1567,
1479, 1284 cm^{-1}

5 NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.8\text{Hz}$), 1.2-1.7
(14H, m), 2.18 (2H, t, $J=7.4\text{Hz}$), 3.89 (3H, s), 7.97
(2H, d, $J=8.5\text{Hz}$), 8.06 (2H, d, $J=8.5\text{Hz}$), 9.15 (1H,
s), 10.49 (1H, s)

APCI-MASS : $m/z = 349$ ($\text{M}+\text{H}^+$)10 Preparation 2971-(4-Methoxycarbonylbenzoyl)-2-(trans-4-n-
pentylcyclohexylcarbonyl)hydrazineIR (KBr) : 3201, 2923, 2852, 1727, 1600, 1567, 1479,
1282 cm^{-1}

15 NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.9\text{Hz}$), 0.9-1.0 (2H,
m), 1.1-1.5 (11H, m), 1.7-1.9 (4H, m), 2.20 (1H,
m), 3.88 (3H, s), 7.97 (2H, d, $J=8.6\text{Hz}$), 8.06 (2H,
d, $J=8.6\text{Hz}$), 9.85 (1H, s), 10.46 (1H, s)

APCI-MASS : $m/z = 375$ ($\text{M}+\text{H}^+$)

20

Preparation 2981-[4-(8-Methoxyoctyloxy)benzoyl]-2-(4-
methoxycarbonylbenzoyl)hydrazine

25 IR (KBr) : 3213, 2935, 2856, 1718, 1600, 1567, 1465,
1282 cm^{-1}

30 NMR (DMSO- d_6 , δ) : 1.2-1.8 (12H, m), 3.21 (3H, s),
3.29 (2H, t, $J=6.4\text{Hz}$), 3.90 (3H, s), 4.04 (2H, t,
 $J=6.5\text{Hz}$), 7.04 (2H, d, $J=8.8\text{Hz}$), 7.90 (2H, d,
 $J=8.8\text{Hz}$), 8.04 (2H, d, $J=8.7\text{Hz}$), 8.10 (2H, d,
 $J=8.7\text{Hz}$), 10.41 (1H, s), 10.64 (1H, s)

APCI-MASS : $m/z = 457$ ($\text{M}+\text{H}^+$)Preparation 299

35 1-(4-Octyloxybenzoyl)-2-(4-methoxycarbonylbenzoyl)-
hydrazine

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IR (KBr) : 3224, 2923, 2854, 1724, 1681, 1643, 1502,
1434, 1282, 1253, 1106 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.8\text{Hz}$), 1.2-1.5
(10H, m), 1.6-1.8 (2H, m), 3.89 (3H, s), 4.04 (2H,
5 t, $J=6.3\text{Hz}$), 7.04 (2H, d, $J=8.7\text{Hz}$), 7.90 (2H, d,
 $J=8.7\text{Hz}$), 8.03 (2H, d, $J=8.6\text{Hz}$), 8.10 (2H, d,
 $J=8.6\text{Hz}$), 10.42 (1H, s), 10.64 (1H, s)

APCI-MASS : $m/z = 427$ ($\text{M}+\text{H}^+$)

10 Preparation 300

A solution of Methyl 4-n-hexyloxybenzoate (2.00 g) and hydrazine hydrate (4.24 g) in ethanol (10 ml) was refluxed for 6 hours. After cooling, the reaction mixture was poured into water. The precipitate was collected by filtration,
15 washed with water and dried over P_2O_5 under reduced pressure to give N-(4-n-hexyloxybenzoyl)hydrazine (1.96 g).

IR (KBr) : 3311, 2954, 2869, 1623, 1253 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.87 (3H, t, $J=6.8\text{Hz}$), 1.2-1.5 (6H,
m), 1.6-1.8 (2H, m), 4.00 (2H, t, $J=6.5\text{Hz}$), 4.40
20 (2H, s), 6.95 (2H, d, $J=8.6\text{Hz}$), 7.77 (2H, d,
 $J=8.6\text{Hz}$), 9.59 (1H, s)

APCI-MASS : $m/z = 237$ ($\text{M}+\text{H}^+$)

The following compounds (Preparations 301 to 308) were
25 obtained according to a similar manner to that of Preparation 300.

Preparation 301

N-(4-Octylphenyl)-N'-aminourea

30 IR (KBr) : 3309.2, 1683.6, 1554.3 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.85 (3H, t, $J=6.7\text{Hz}$), 1.1-1.4
(10H, m), 1.4-1.6 (2H, m), 2.48 (2H, t, $J=8.9\text{Hz}$),
4.32 (2H, s), 7.03 (2H, d, $J=8.4\text{Hz}$), 7.32 (1H, s),
7.38 (2H, d, $J=8.4\text{Hz}$), 8.50 (1H, s)

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Preparation 302

N-[4-(4-tert-Butoxycarbonylpiperazin-1-yl)phenyl]-N'-aminourea

IR (KBr) : 3237.9, 1695.1, 1670.1, 1540.8, 1230.4 cm^{-1}

5 NMR (DMSO- d_6 , δ) : 1.42 (9H, s), 2.97 (4H, t, $J=4.9\text{Hz}$), 3.44 (4H, t, $J=4.9\text{Hz}$), 4.30 (2H, s), 6.85 (2H, d, $J=9.0\text{Hz}$), 7.26 (1H, s), 7.36 (2H, d, $J=9.0\text{Hz}$), 8.41 (1H, s)

10 Preparation 303

4-Cyclohexylbenzoylhydrazine

IR (KBr) : 3318, 2925, 2852, 1625, 1606, 1527, 1326 cm^{-1}

15 NMR (DMSO- d_6 , δ) : 1.1-1.5 (5H, m), 1.6-2.0 (5H, m), 2.4-2.6 (1H, m), 4.44 (2H, s), 7.27 (2H, d, $J=8.2\text{Hz}$), 7.73 (2H, d, $J=8.2\text{Hz}$), 9.66 (1H, s)

APCI-MASS : $m/z = 219$ ($M+H$)⁺

Preparation 304

20 4-(Piperidin-1-yl)benzoylhydrazine

IR (KBr) : 3263, 2852, 1612, 1504, 1245, 1124 cm^{-1}

NMR (DMSO- d_6 , δ) : 1.57 (6H, s), 3.25 (4H, s), 4.35 (2H, s), 6.90 (2H, d, $J=9.0\text{Hz}$), 7.68 (2H, d, $J=9.0\text{Hz}$), 9.44 (1H, s)

25 APCI-MASS : $m/z = 220$ ($M+H$)⁺Preparation 305

4-(4-n-Propyloxyphenyl)benzoylhydrazine

IR (KBr) : 3350, 3276, 1610, 1494, 1288, 978 cm^{-1}

30 NMR (DMSO- d_3 , δ) : 0.99 (3H, t, $J=7.5\text{Hz}$), 1.75 (2H, tq, $J=6.5$ and 7.5Hz), 3.98 (2H, t, $J=6.5\text{Hz}$), 4.50 (2H, s), 7.03 (2H, d, $J=8.8\text{Hz}$), 7.65 (2H, d, $J=8.8\text{Hz}$), 7.69 (2H, d, $J=8.4\text{Hz}$), 7.88 (2H, d, $J=8.4\text{Hz}$), 9.79 (1H, s)

35 APCI-MASS : $m/z = 271$ ($M+H$)⁺

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Preparation 306

4-Methoxycarbonylbenzoylhydrazine

IR (KBr) : 3322, 3250, 3018, 1727, 1658, 1621, 1565,
1432, 1280, 1110 cm^{-1} 5 NMR (DMSO- d_6 , δ) : 3.87 (3H, s), 4.58 (2H, s), 7.93
(2H, dd, $J=8.6$ and 3.1Hz), 7.02 (2H, dd, $J=8.6$ and
 3.1Hz), 9.97 (1H, s)APCI-MASS : $m/z = 195$ ($\text{M}+\text{H}^+$)10 Preparation 307

Trans-4-n-pentylcyclohexylcarbonylhydrazine

IR (KBr) : 3303, 3199, 2954, 2925, 2850, 1639, 1619,
1533, 1457 cm^{-1} 15 NMR (DMSO- d_6 , δ) : 0.8-1.0 (6H, m), 1.1-1.5 (10H, m),
1.6-2.2 (5H, m), 4.10 (2H, s), 8.85 (1H, s)APCI-MASS : $m/z = 213$ ($\text{M}+\text{H}^+$)Preparation 308

4-(8-Methoxyoctyloxy)benzoylhydrazine

20 IR (KBr) : 3309, 2937, 2852, 1606, 1494, 1253 cm^{-1} NMR (DMSO- d_6 , δ) : 1.2-1.8 (12H, m), 3.20 (3H, s),
3.25 (2H, t, $J=6.5\text{Hz}$), 3.99 (2H, t, $J=6.5\text{Hz}$), 4.39
(2H, s), 6.95 (2H, d, $J=8.8\text{Hz}$), 7.77 (2H, d,
 $J=8.8\text{Hz}$), 9.58 (1H, s)25 APCI-MASS : $m/z = 295$ ($\text{M}+\text{H}^+$)Preparation 309

To a stirred solution of 4-bromo-4'-n-heptylbiphenyl
(2.71 g) in tetrahydrofuran (100 ml) was added dropwise a
30 solution of n-butyllithium in a mixture of diethyl ether and
n-hexane (1.6M, 5.1 ml) at -78°C . After stirring at -78°C
for 30 minutes, the resultant mixture was added to a solution
of diethyl oxalate (3.4 ml) in tetrahydrofuran (50 ml) at
 -78°C . The resultant mixture was allowed to warm to 0°C for
35 about 1 hour, and to the mixture was added acetic acid (0.5

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ml). Evaporation gave a residue which was taken up into a mixture of water and ethyl acetate. The organic layer was separated, washed with brine, dried over magnesium sulfate. Evaporation gave a residue which was chromatographed on silica gel (200 ml) eluting with a mixture of n-hexane and ethyl acetate (10:0-95:5, V/V) to give 1-Ethyl-2-(4-n heptylphenyl)ethanedione (2.23 g).

NMR (CDCl₃, δ) : 0.88 (3H, t, J=6.6Hz), 1.10-1.50 (8H, m), 1.44 (3H, t, J=7.1Hz), 1.50-1.80 (2H, m), 2.66 (2H, t, J=7.7Hz), 4.47 (2H, q, J=7.1Hz), 7.20-7.40 (2H, m), 7.50-7.64 (2H, m), 7.64-7.85 (2H, m), 8.00-8.20 (2H, m)

APCI-MASS : m/z = 353 (M⁺+1)

15 Preparation 310

To a suspension of sodium hydride (60% in oil, 0.37 g) in tetrahydrofuran (40 ml) was added by portions 4-acetyl-4'-n-heptylbiphenyl (2.50 g) at ambient temperature. After stirring at ambient temperature for 1 hour, to the solution was added triethyl phosphonoacetate (1.9 ml) and the mixture was heated to reflux for 5 hours. After cooling to ambient temperature, to the mixture was added acetic acid (0.53 ml) and evaporated. The residue was taken up into a mixture of water and ethyl acetate. The separated organic layer was washed with brine, dried over magnesium sulfate and evaporated. The residue was chromatographed on silica gel (200 ml) eluting with mixture of n-hexane and diisopropyl ether (99:1-20:1, V/V) to give Ethyl (E)-3-[4-(4-heptylphenyl)phenyl]-2-butenate (2.19 g).

NMR (CDCl₃, δ) : 0.88 (3H, t, J=6.6Hz), 1.13-1.48 (8H, m), 1.48-1.78 (2H, m), 2.61 (3H, s), 2.65 (2H, t, J=7.4Hz), 4.22 (2H, q, J=7.1Hz), 6.20 (1H, t, J=2.7Hz), 7.23-7.28 (2H, m), 7.50-7.63 (6H, m)

APCI-MASS : m/z = 365 (M⁺+1)

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Preparation 311

To a solution of 4-bromo-4'-n-heptylbiphenyl (5.1 g) in tetrahydrofuran (60 ml) was added a solution of n-butyllithium in a mixture of n-hexane and diethyl ether (1.6M, 9.7 ml) at -60°C. After stirring at -60°C for 30 minutes, to the mixture was added N,N-dimethylacetamide (4.3 ml) and the reaction mixture was allowed to warm to 0°C. The reaction mixture was taken up into a mixture of cold water and ethyl acetate, and the pH was adjusted to around 1 with 1N hydrochloric acid. The organic layer was separated, washed with brine, dried over magnesium sulfate and evaporated. The residue was chromatographed on silica gel (150 ml) eluting with a mixture of n-hexane and ethyl acetate (20:1, V/V) to give 4-Acetyl-4'-n-heptylbiphenyl (1.60 g).

NMR (CDCl₃, δ) : 0.89 (3H, t, J=6.6Hz), 1.05-1.48 (8H, m), 1.48-1.75 (2H, m), 2.65 (2H, t, J=7.6Hz), 2.63 (3H, s), 7.20-7.31 (2H, m), 7.52-7.58 (2H, m), 7.65-7.70 (2H, m), 7.97-8.05 (2H, m)

APCI-MASS : m/z = 295 (M+1)

Preparation 312

To a solution of Methyl 4-[4-(8-hydroxyoctyloxy)phenyl]-benzoate (500 mg) and dihydropyran (141 mg) in dichloromethane (15 ml) was added p-toluenesulfonic acid (5 ml). The mixture was stirred at ambient temperature for 10 minutes and diluted with dichloromethane and washed with water and brine. The separated organic layer was dried over magnesium sulfate and evaporated under reduced pressure to give Methyl 4-[4-(8-tetrahydropyran-2-yl-oxyoctyloxy)phenyl]-benzoate (616 mg).

IR (KBr) : 2935, 2856, 1722, 1602, 1438, 1290, 1199 cm⁻¹

NMR (CDCl₃, δ) : 1.3-2.0 (18H, m), 3.3-3.9 (4H, m), 3.93 (3H, s), 4.00 (2H, t, J=6.5Hz), 4.5-4.6 (1H, m), 6.98 (2H, d, J=8.7Hz), 7.56 (2H, d, J=8.7Hz),

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7.62 (2H, d, J=8.3Hz), 8.07 (2H, d, J=8.3Hz)

Preparation 313

To a solution of titanium(IV) chloride (11.6 g) in
5 dichloromethane (100 ml) was added 4-n-Pentyloxyacetophenone
(10.3 g) and Methyl 4-formylbenzoate (8.21 g) in
dichloromethane (50 ml) dropwise at 0°C. To the mixture was
added triethylamine (11.15 ml) in dichloromethane (30 ml).
The mixture was stirred at 0°C for 30 minutes and diluted
10 with n-hexane. The organic layer was washed with water (four
times), brine and dried over magnesium sulfate. The solvents
were removed under reduced pressure and the residue was
trituated with iso-propyl ether. The solid was collected by
filtration and dried to give 1-(4-Methoxycarbonylphenyl)-3-
15 (4-n-pentyloxyphenyl)-1-propen-3-one (4.02 g).

IR (KBr) : 2950, 2910, 2863, 1718, 1654, 1606, 1274,
1176 cm⁻¹

NMR (CDCl₃, δ) : 0.94 (3H, t, J=6.9Hz), 1.3-1.6 (4H,
m), 1.8-2.0 (2H, m), 3.93 (3H, s), 4.04 (2H, t,
20 J=6.5Hz), 6.97 (2H, d, J=8.8Hz), 7.60 (1H, d,
J=15.7Hz), 7.68 (2H, d, J=8.4Hz), 7.80 (1H, d,
J=15.7Hz), 8.0-8.2 (4H, m)

APCI-MASS : m/z = 353 (M+H⁺)

25 Preparation 314

To a solution of titanium(IV) chloride (13.88 g) in
dichloromethane (100 ml) was added Ethyl 4-acetylbenzoate
(11.53 g) and 4-n-pentyloxybenzaldehyde (12.69 g) in
dichloromethane (50 ml) was added dropwise at 0°C. To the
30 mixture was added triethylamine (12.44 ml) in dichloromethane
(30 ml). The mixture was stirred at 0°C for 30 minutes and
diluted with ethyl acetate. The organic layer was washed
with water (four times) and brine and dried over magnesium
sulfate. The solvents were removed under reduced pressure
35 and the residue was trituated with n-hexane. The solid was

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collected by filtration and dried to give 1-(4-n-Pentyloxyphenyl)-3-(4-ethoxycarbonylphenyl)-1-propen-3-one (13.45 g).

IR (KBr) : 2956, 2929, 2861, 1718, 1656, 1594, 1510,
1272 cm^{-1}

NMR (CDCl_3 , δ) : 0.94 (3H, t, $J=7.1\text{Hz}$), 1.3-1.9 (9H, m), 4.01 (2H, t, $J=6.5\text{Hz}$), 4.42 (2H, q, $J=7.1\text{Hz}$), 6.93 (1H, d, $J=8.7\text{Hz}$), 7.37 (1H, d, $J=15.6\text{Hz}$), 7.60 (2H, d, $J=8.7\text{Hz}$), 7.81 (1H, d, $J=15.6\text{Hz}$), 8.03 (2H, d, $J=8.5\text{Hz}$), 8.16 (2H, d, $J=8.5\text{Hz}$)

APCI-MASS : $m/z = 367$ ($M+H^+$)

The following compound was obtained according to a similar manner to that of Preparation 314.

Preparation 315

Ethyl 4-oxo-1-(4-n-hexyloxyphenyl)piperidine-3-carboxylate

IR (Neat) : 1664.3, 1511.9, 1243.9, 1216.9 cm^{-1}

NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.5\text{Hz}$), 1.2-1.5 (6H, m), 1.32 (3H, t, $J=7.1\text{Hz}$), 1.65-1.85 (2H, m), 2.51 (2H, t, $J=5.8\text{Hz}$), 3.31 (2H, t, $J=5.8\text{Hz}$), 3.76 (2H, s), 3.91 (2H, t, $J=6.5\text{Hz}$), 4.26 (2H, q, $J=7.1\text{Hz}$), 6.84 (2H, d, $J=9.2\text{Hz}$), 6.94 (2H, d, $J=9.2\text{Hz}$), 12.06 (1H, s)

APCI-MASS : $m/z = 348$ ($M^+ + H$)

Preparation 316

To a solution of 4-n-Hexyloxybenzoylhydrazine (1.96 g) and pyridine (0.74 ml) in tetrahydrofuran (20 ml) was added a solution of terephthalic acid monomethyl ester chloride (1.56 g) in tetrahydrofuran (15 ml) dropwise at 0°C . The reaction mixture was stirred at room temperature for 2 hours, and poured into water. The precipitate was collected by filtration and washed with acetonitrile. The residue was

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dried under reduced pressure to give 1-(4-n-Hexyloxybenzoyl)-2-(4-methoxycarbonylbenzoyl)hydrazine (2.99 g).

IR (KBr) : 3230, 3023, 2954, 2858, 1724, 1681, 1643, 1280, 1251, 1105 cm^{-1}

5 NMR (DMSO-d_6 , δ) : 0.88 (3H, t, $J=6.6\text{Hz}$), 1.2-1.5 (6H, m), 1.6-1.8 (2H, m), 3.90 (3H, s), 4.04 (2H, t, $J=6.4\text{Hz}$), 7.04 (2H, d, $J=8.7\text{Hz}$), 7.90 (2H, d, $J=8.7\text{Hz}$), 8.03 (2H, d, $J=8.4\text{Hz}$), 8.10 (2H, d, $J=8.4\text{Hz}$), 10.42 (1H, s), 10.65 (1H, s)

10 APCI-MASS : $m/z = 399$ ($M+H$) $^+$

Preparation 317

A mixture of 1-(4-n-Hexyloxyphenyl)-4-piperidone (0.823 g), 1-(4-Ethoxycarbonylphenyl)piperazine (0.7 g), and
15 titanium(IV) isopropoxide (1.11 ml) was stirred at room temperature. After 1 hour, the IR spectrum of the mixture showed no ketone band, and the viscous solution was diluted with absolute ethanol (3 ml). Sodium cyanoborohydride (0.121 g) was added, and the solution was stirred for 3 hours.
20 Water (3 ml) was added with stirring, and the resulting inorganic precipitate was filtered and washed with ethanol. The filtrate was extracted with ethyl acetate. The organic layer was taken and dried over magnesium sulfate. The magnesium sulfate was filtered off, and filtrate was
25 evaporated under reduced pressure to give Ethyl 4-[4-[1-(4-n-hexyloxyphenyl)piperidin-4-yl]piperazin-1-yl]benzoate (331 mg).

IR (KBr) : 1708.6, 1606.4, 1511.9, 1284.4, 1236.1 cm^{-1}

30 NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.5\text{Hz}$), 1.2-1.55 (6H, m), 1.37 (3H, t, $J=7.1\text{Hz}$), 1.6-1.85 (4H, m), 1.95 (2H, d, $J=12\text{Hz}$), 2.41 (1H, m), 2.62 (2H, d, $J=11\text{Hz}$), 2.75 (4H, t, $J=5.0\text{Hz}$), 3.35 (4H, t, $J=5.0\text{Hz}$), 3.58 (2H, d, $J=11\text{Hz}$), 3.90 (2H, t, $J=6.5\text{Hz}$), 4.32 (2H, q, $J=7.1\text{Hz}$), 6.7-7.0 (6H, m),
35 7.92 (2H, d, $J=9.0\text{Hz}$)

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APCI-MASS : $m/z = 494$ ($M^+ + H$)

The following compound was obtained according to a similar manner to that of Preparation 317.

5

Preparation 318

1-tert-Butoxycarbonyl-4-(4-phenylcyclohexyl)piperazine

IR (KBr) : 1697.1, 1245.8, 1170.6, 1124.3, 700 cm^{-1}

10 NMR (CDCl_3 , δ) : 1.2-1.65 (17H, m), 1.9-2.1 (4H, m),
2.3-2.6 (2H, m), 2.55 (4H, t, $J=5.0\text{Hz}$), 3.44 (4H,
t, $J=5.0\text{Hz}$), 7.1-7.4 (5H, m)

APCI-MASS : $m/z = 345$ ($M^+ + H$)Preparation 319

15 To a suspension of 1-(N,N-dimethylamino)-2-(4-ethoxycarbonylbenzoyl)ethylene (0.742 g) and 4-n-hexyloxybenzamidinium hydrochloride (0.847 g) in methanol (10 ml) was added 28% sodium methoxide in methanol (0.64 ml). The suspension was refluxed for 6 hours, and partitioned with
20 ethyl acetate and water. The organic layer was washed with water and brine, dried over magnesium sulfate and evaporated under reduced pressure. The residue was triturated with acetonitrile, collected by filtration and dried under reduced pressure to give Methyl 4-[2-(4-n-hexyloxyphenyl)pyrimidin-6-yl]benzoate (0.61 g).

25

IR (KBr) : 2931, 2861, 1722, 1606, 1558, 1251 cm^{-1}

30 NMR (CDCl_3 , δ) : 0.95 (3H, t, $J=6.7\text{Hz}$), 1.2-1.6 (6H, m), 1.8-2.0 (2H, m), 3.97 (3H, s), 4.05 (2H, t, $J=6.5\text{Hz}$), 7.02 (2H, d, $J=8.8\text{Hz}$), 7.56 (1H, d, $J=5.2\text{Hz}$), 8.18 (2H, d, $J=8.6\text{Hz}$), 8.28 (2H, d, $J=8.6\text{Hz}$), 8.52 (2H, d, $J=8.8\text{Hz}$), 8.83 (1H, d, $J=5.2\text{Hz}$)

APCI-MASS : $m/z = 391$ ($M + H^+$)35 Preparation 320

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A solution of 1-(4-Methoxycarbonylphenyl)-3-(4-n-pentyloxyphenyl)-1-propen-3-one (4.0 g) and hydroxyamine hydrochloride (3.93 g) in ethanol (40 ml) was refluxed for 4 hours. The mixture was diluted with ethyl acetate, and the organic layer was washed with water (x 2), brine and dried over magnesium sulfate. The solvents were removed under reduced pressure to give crude oxime. To a solution of crude oxime in 1,2-dichloroethane (20 ml) was added activated-manganese(IV) oxide (10.0 g). The reaction mixture was refluxed for 2 hours and filtered. The residue was washed with dichloromethane. The solvents were removed under reduced pressure and the residue was triturated with acetonitrile. The solid was collected by filtration and dried to give Methyl 4-[3-(4-n-pentyloxyphenyl)isoxazol-5-yl]benzoate (0.98 g).

IR (KBr) : 2940, 2871, 1720, 1612, 1278, 1249, 1178, 1108 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.94 (3H, t, $J=7.2\text{Hz}$), 1.2-1.6 (4H, m), 1.7-1.9 (2H, m), 3.95 (3H, s), 4.01 (2H, t, $J=6.5\text{Hz}$), 6.87 (1H, s), 6.98 (2H, d, $J=8.9\text{Hz}$), 7.79 (2H, d, $J=8.9\text{Hz}$), 7.89 (2H, d, $J=8.6\text{Hz}$), 8.15 (2H, d, $J=8.6\text{Hz}$)

APCI-MASS : m/z = 366 ($M+H^+$)

25 Preparation 321

To a solution of 4-Methoxycarbonylphenylhydroxyimino-methyl chloride (16.98 g) and 4-n-pentyloxyphenylacetylene (18.96 g) in tetrahydrofuran (170 ml) was added triethylamine (14.4 ml) in tetrahydrofuran (140 ml) over a period of 2 hours at 40°C and the mixture was stirred at 40°C for 30 minutes. The mixture was diluted with dichloromethane and washed with water and brine. The separated organic layer was dried over magnesium sulfate and evaporated under reduced pressure. The residue was triturated with acetonitrile. The precipitate was collected by filtration and dried to give

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Methyl 4-[5-(4-n-pentyloxyphenyl)isoxazol-3-yl]benzoate
(24.56 g).

IR (KBr) : 2942, 2873, 1716, 1616, 1508, 1280,
1108 cm^{-1}

5 NMR (CDCl_3 , δ) : 0.95 (3H, t, $J=6.9\text{Hz}$), 1.3-1.6 (4H,
m), 1.8-2.0 (2H, m), 3.95 (3H, s), 4.02 (2H, t,
 $J=6.5\text{Hz}$), 6.74 (1H, s), 6.99 (2H, d, $J=8.8\text{Hz}$), 7.76
(2H, d, $J=8.8\text{Hz}$), 7.93 (2H, d, $J=8.5\text{Hz}$), 8.14 (2H,
d, $J=8.5\text{Hz}$)

10 APCI-MASS : $m/z = 366$ ($M+H^+$)

Preparation 322

To a solution of N-Hydroxy-4-octyloxybenzamidine (1.89 g) in pyridine (10 ml) was added terephthalic acid monomethyl ester chloride (1.67 g) in tetrahydrofuran (15 ml) dropwise
15 at 0°C . The mixture was stirred at room temperature for 15 minutes, and poured into water. The precipitate was collected by filtration, dried and dissolved in pyridine (10 ml). The solution was refluxed for 1 hour. The reaction
20 mixture was diluted with ethyl acetate and washed with 1N HCl, water and brine. The separated organic layer was dried over magnesium sulfate and the solvents were removed under reduced pressure. The residue was triturated with acetonitrile and collected by filtration. The solid was
25 dried to give Methyl 4-[3-(4-n-hexyloxyphenyl)-1,2,4-oxadiazol-5-yl]benzoate (2.27 g).

IR (KBr) : 2950, 2925, 2863, 1720, 1280, 1255 cm^{-1}

NMR (CDCl_3 , δ) : 0.92 (3H, t, $J=6.6\text{Hz}$), 1.2-1.9 (8H,
m), 3.97 (3H, s), 4.03 (2H, d, $J=6.5\text{Hz}$), 7.00 (2H,
30 d, $J=8.9\text{Hz}$), 8.09 (2H, d, $J=8.9\text{Hz}$), 8.20 (2H, d,
 $J=6.6\text{Hz}$), 8.28 (2H, d, $J=6.6\text{Hz}$)

APCI-MASS : $m/z = 381$ ($M+H$)⁺

Preparation 323

35 A suspension of 1-(4-n-Hexyloxybenzoyl)-2-(4-

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methoxycarbonylbenzoyl)hydrazine (1.00 g) in phosphorus
oxychloride (5 ml) was refluxed for 1 hour. After cooling,
the solution was concentrated under reduced pressure. The
residue was poured into ice-water and extracted with
5 dichloromethane. The organic layer was washed with water,
brine and dried over magnesium sulfate. The solvents were
removed under reduced pressure. The residue was triturated
with acetonitrile, collected by filtration and dried under
reduced pressure to give Methyl 4-[5-(4-n-hexyloxyphenyl)-
10 1,3,4-oxadiazole-2-yl]benzoate (761 mg).

IR (KBr) : 2954, 2854, 1724, 1612, 1494, 1280,
1249 cm^{-1}

NMR (CDCl_3 , δ) : 0.91 (3H, t, $J=6.6\text{Hz}$), 1.3-1.6 (6H,
m), 1.7-1.9 (2H, m), 3.96 (3H, s), 4.04 (2H, t,
15 $J=6.5\text{Hz}$), 7.02 (2H, d, $J=8.6\text{Hz}$), 8.07 (2H, d,
 $J=8.6\text{Hz}$), 8.19 (4H, m)

APCI-MASS : $m/z = 381$ ($M+H$)⁺

The following compounds (Preparations 324 to 327) were
20 obtained according to a similar manner to that of Preparation
323.

Preparation 324

Methyl 4-[5-[4-(4-n-propyloxyphenyl)phenyl]-1,3,4-
25 oxadiazol-2-yl]benzoate

IR (KBr) : 1720, 1614, 1496, 1280, 1103 cm^{-1}

NMR (CDCl_3 , δ) : 1.07 (3H, d, $J=7.5\text{Hz}$), 1.84 (2H, tq,
 $J=6.5$ and 7.5Hz), 3.98 (3H, s), 3.99 (2H, t,
 $J=6.5\text{Hz}$), 7.01 (2H, d, $J=8.8\text{Hz}$), 7.60 (2H, d,
30 $J=8.8\text{Hz}$), 7.73 (2H, d, $J=8.5\text{Hz}$), 8.19 (2H, d,
 $J=8.5\text{Hz}$), 8.22 (4H, s)

APCI-MASS : $m/z = 415$ ($M+H$)⁺

Preparation 325

35 Methyl 4-[5-(n-nonyl)-1,3,4-oxadiazol-2-yl]benzoate

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IR (KBr) : 2915, 2848, 1724, 1569, 1436, 1413,
1278 cm^{-1}

NMR (CDCl_3 , δ) : 0.88 (3H, t, $J=6.4\text{Hz}$), 1.2-1.6 (12H, m), 1.8-2.0 (2H, m), 2.94 (2H, t, $J=7.6\text{Hz}$), 3.96 (3H, s), 8.11 (2H, d, $J=8.8\text{Hz}$), 8.17 (2H, d, $J=8.8\text{Hz}$)

APCI-MASS : $m/z = 331$ ($\text{M}+\text{H}^+$)

Preparation 326

10 Methyl 4-[5-[4-(8-methoxyoctyloxy)phenyl]-1,3,4-oxadiazol-2-yl]benzoate

IR (KBr) : 2925, 2858, 1722, 1614, 1280, 1259 cm^{-1}

NMR (CDCl_3 , δ) : 1.3-1.9 (12H, m), 3.36 (3H, s), 3.37 (2H, t, $J=6.4\text{Hz}$), 3.97 (3H, s), 4.04 (2H, t, $J=6.5\text{Hz}$), 7.02 (2H, d, $J=8.9\text{Hz}$), 8.07 (2H, d, $J=8.9\text{Hz}$), 8.20 (4H, s)

APCI-MASS : $m/z = 439$ ($\text{M}+\text{H}^+$)

Preparation 327

20 Methyl 4-[5-(4-n-octyloxyphenyl)-1,3,4-oxadiazol-2-yl]benzoate

IR (KBr) : 2923, 2856, 1722, 1614, 1496, 1282,
1103 cm^{-1}

NMR (CDCl_3 , δ) : 0.89 (3H, t, $J=6.8\text{Hz}$), 1.2-1.6 (10H, m), 1.7-1.9 (2H, m), 3.97 (3H, s), 4.04 (2H, t, $J=6.5\text{Hz}$), 7.03 (2H, d, $J=8.7\text{Hz}$), 8.07 (2H, d, $J=8.7\text{Hz}$), 8.19 (4H, m)

APCI-MASS : $m/z = 409$ ($\text{M}+\text{H}^+$)

Preparation 328

30 A suspension of 1-(4-Hexyloxybenzoyl)-2-(4-methoxycarbonylbenzoyl)hydrazine (1.0 g) and di-phosphorus pentasulfide (1.28 g) in tetrahydrofuran (15 ml) was stirred at room temperature for 3 hours. The mixture was diluted with water (30 ml), stirred for 30 minutes and extracted with

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dichloromethane. The organic layer was washed with brine, dried over magnesium sulfate and evaporated under reduced pressure. The residue was triturated with acetonitrile. The solid was collected by filtration and dried under reduced pressure to give Methyl 4-[5-(4-n-hexyloxyphenyl)-1,3,4-thiadiazol-2-yl]benzoate (816 mg).

IR (KBr) : 2925, 2871, 1722, 1608, 1436, 1276,
1106 cm^{-1}

NMR (CDCl_3 , δ) : 0.92 (3H, t, $J=6.6\text{Hz}$), 1.3-2.0 (8H, m), 3.96 (3H, s), 4.03 (2H, t, $J=6.5\text{Hz}$), 6.99 (2H, d, $J=8.6\text{Hz}$), 7.95 (2H, d, $J=8.4\text{Hz}$), 8.16 (2H, d, $J=8.4\text{Hz}$)

APCI-MASS : $m/z = 397$ ($M+H$)⁺

The following compounds (Preparations 329 to 334) were obtained according to a similar manner to that of Preparation 328.

Preparation 329

Methyl 4-[5-[4-(8-methoxyoctyloxy)phenyl]-1,3,4-thiadiazol-2-yl]benzoate

IR (KBr) : 3210, 2935, 2856, 1718, 1600, 1465, 1280,
1110 cm^{-1}

NMR (CDCl_3 , δ) : 1.3-1.6 (10H, m), 1.7-1.9 (2H, m), 3.33 (3H, s), 3.37 (2H, d, $J=6.4\text{Hz}$), 3.96 (3H, s), 4.03 (2H, t, $J=6.5\text{Hz}$), 6.99 (2H, d, $J=8.9\text{Hz}$), 7.94 (2H, d, $J=8.9\text{Hz}$), 8.07 (2H, d, $J=8.6\text{Hz}$), 8.16 (2H, d, $J=8.6\text{Hz}$)

APCI-MASS : $m/z = 455$ ($M+H$)⁺

Preparation 330

Methyl 4-[5-(4-cyclohexylphenyl)-1,3,4-thiadiazol-2-yl]benzoate

IR (KBr) : 2925, 2850, 1716, 1432, 1274, 1108, 997 cm^{-1}

NMR (CDCl_3 , δ) : 1.2-1.6 (5H, m), 1.7-2.0 (5H, m),

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2.58 (1H, m), 3.96 (3H, s), 7.34 (2H, d, J=8.2Hz),
7.93 (2H, d, J=8.2Hz), 8.07 (2H, d, J=8.6Hz), 8.16
(2H, d, J=8.6Hz)

APCI-MASS : m/z = 379 (M+H⁺)

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Preparation 331

Methyl 4-[5-[4-(piperidin-1-yl)phenyl]-1,3,4-thiadiazol-2-yl]benzoate

10 IR (KBr) : 2940, 2848, 1720, 1602, 1436, 1415, 1276,
1108 cm⁻¹

NMR (CDCl₃, δ) : 1.68 (6H, br), 3.34 (4H, br), 3.96
(3H, s), 6.95 (2H, d, J=8.7Hz), 7.88 (2H, d,
J=8.7Hz), 8.05 (2H, d, J=8.6Hz), 8.16 (2H, d,
J=8.6Hz)

15 APCI-MASS : m/z = 380 (M+H⁺)

Preparation 332

Methyl 4-[5-(4-n-octyloxyphenyl)-1,3,4-thiadiazol-2-yl]benzoate

20 IR (KBr) : 2927, 2858, 1720, 1606, 1434, 1276,
1106 cm⁻¹

NMR (CDCl₃, δ) : 0.89 (3H, t, J=6.8Hz), 1.2-1.6 (10H,
m), 1.7-1.9 (2H, m), 3.96 (3H, s), 4.03 (2H, t,
J=6.5Hz), 7.00 (2H, d, J=8.9Hz), 7.95 (2H, d,
25 J=8.9Hz), 8.06 (2H, d, J=8.4Hz), 8.16 (2H, d,
J=8.4Hz)

APCI-MASS : m/z = 425 (M+H⁺)

Preparation 333

30 Methyl 4-[5-(4-trans-n-pentylcyclohexyl)-1,3,4-
thiadiazol-2-yl]benzoate

IR (KBr) : 2923, 2850, 1722, 1440, 1276, 1110 cm⁻¹

NMR (CDCl₃, δ) : 0.89 (3H, t, J=6.9Hz), 1.0-1.8 (13H,
m), 1.92 (2H, d, J=13.4Hz), 2.24 (2H, d, J=12.2Hz),
35 3.15 (1H, tt, J=12.2 and 3.5Hz), 3.95 (3H, s), 8.01

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(2H, dd, J=8.6 and 2.0Hz), 8.13 (2H, dd, J=8.6 and 2.0Hz)

APCI-MASS : m/z = 373 (M+H⁺)

5 Preparation 334

Methyl 4-[5-[4-(4-n-propyloxyphenyl)phenyl]-1,3,4-thiadiazol-2-yl]benzoate

IR (KBr) : 1720, 1540, 1508, 1282 cm⁻¹

10 NMR (CDCl₃, δ) : 1.07 (3H, t, J=7.5Hz), 1.85 (2H, m),
3.9-4.1 (5H, m), 7.01 (2H, d, J=8.8Hz), 7.59 (2H, d, J=8.8Hz), 7.70 (2H, d, J=8.4Hz), 8.07 (2H, d, J=8.4Hz), 8.1-8.2 (4H, m)

APCI-MASS : m/z = 431 (M+H)⁺

15 Preparation 335

To a suspension of 4-hexyloxybenzoic acid in oxalyl chloride (10 ml) and dichloromethane (10 ml) was added N,N-dimethylformamide (0.1 ml). The mixture was stirred at room temperature for 2 hours. The solvent was removed under reduced pressure to give crude 4-hexyloxybenzoyl chloride. To a suspension of Ethyl 3-amino-4-hydroxybenzoate (733 mg) and triethylamine (1.38 ml) and 4-dimethylaminopyridine (DMAP, 10 mg) in methylene chloride (10 ml) was added the solution of 4-hexyloxybenzoyl chloride obtained above in dichloromethane (5 ml) dropwise at 10°C. The reaction mixture was stirred at 10°C for 1.5 hours and diluted with dichloromethane (20 ml). The solution was washed with H₂O (20 ml), 1N HCl aq. (20 ml x 2), H₂O (20 ml) and brine (20 ml) successively. The organic layer was dried over MgSO₄ and the solvent was removed under reduced pressure. To the residue was added toluene (15 ml) and p-toluenesulfonic acid (10 mg). The mixture was refluxed for 6 hours and the solvent was removed under reduced pressure. The residue was triturated with acetonitrile, and precipitate was collected with filtration and dried over PO₅ to give 2-(4-

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Hexyloxyphenyl)-5-ethoxycarbonylbenzoxazole (0.60 g).

IR (KBr) : 2952, 2871, 1712, 1623, 1500, 1294,
1255 cm^{-1}

NMR (CDCl_3 , δ) : 0.92 (3H, t, $J=6.6\text{Hz}$), 1.3-1.6 (9H,
m), 1.7-1.9 (2H, m), 4.05 (2H, t, $J=6.5\text{Hz}$), 4.42
(2H, q, $J=7.1\text{Hz}$), 7.03 (2H, d, $J=6.9\text{Hz}$), 7.57 (1H,
d, $J=8.6\text{Hz}$), 8.08 (1H, dd, $J=8.6$ and 1.7Hz), 8.18
(2H, d, $J=6.9\text{Hz}$), 8.43 (1H, d, $J=1.7\text{Hz}$)

APCI-MASS : m/z = 368 ($M+H^+$)

The following compounds (Preparations 336 to 337) were
obtained according to a similar manner to that of Preparation
335.

Preparation 336

5-Ethoxycarbonyl-2-(2-octyloxy pyridin-5-yl)benzoxazole

IR (KBr) : 2933, 2858, 1716, 1623, 1604, 1577, 1467,
1290, 1213, 1083 cm^{-1}

NMR (CDCl_3 , δ) : 0.89 (3H, t, $J=6.7\text{Hz}$), 1.2-1.5 (10H,
m), 1.43 (3H, t, $J=7.1\text{Hz}$), 1.7-1.9 (2H, m), 4.3-4.5
(4H, m), 6.87 (1H, d, $J=8.7\text{Hz}$), 7.60 (1H, d,
 $J=8.6\text{Hz}$), 8.11 (1H, dd, $J=8.6$ and 1.6Hz), 8.37 (1H,
dd, $J=8.8$ and 2.4Hz), 8.45 (1H, d, $J=1.6\text{Hz}$), 9.03
(1H, d, $J=2.4\text{Hz}$)

APCI-MASS : m/z = 397 ($M+H^+$)

Preparation 337

2-[4-(4-Hexylphenyl)phenyl]-5-ethoxycarbonylbenzoxazole

IR (KBr) : 2952, 2871, 1712, 1623, 1500, 1294, 1255,
1024 cm^{-1}

NMR (CDCl_3 , δ) : 0.90 (3H, t, $J=6.6\text{Hz}$), 1.2-1.5 (6H,
m), 1.44 (3H, t, $J=7.1\text{Hz}$), 1.6-1.8 (2H, m), 2.67
(2H, t, $J=7.3\text{Hz}$), 4.43 (2H, q, $J=7.1\text{Hz}$), 7.27 (1H,
d, $J=3.7\text{Hz}$), 7.32 (1H, s), 7.5-7.7 (3H, m), 7.77
(2H, d, $J=8.6\text{Hz}$), 8.12 (1H, dd, $J=8.6$ and 1.7Hz),

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8.32 (2H, d, J=8.5Hz), 8.48 (1H, d, J=1.2Hz)

APCI-MASS : m/z = 428 (M+H⁺)Preparation 338

5 A suspension of 4-[4-(8-bromooctyloxy)phenyl]benzoic acid (1 g) in 2,6-dimethylmorpholine (3.06 ml) was refluxed for 30 minutes. The reaction mixture was added to a mixture of water and ethyl acetate and adjusted to pH 2.0 with conc. HCl. The organic layer was taken and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure to give 4-[4-[8-(2,6-dimethylmorpholin-4-yl)octyloxy]phenyl]benzoic acid hydrochloride (0.95 g).

IR (KBr) : 2939.0, 1704.8, 1606.4, 1189.9 cm⁻¹

15 NMR (DMSO-d₆, δ) : 1.12 (6H, d, J=6.3Hz), 1.2-1.6 (10H, m), 1.6-1.9 (4H, m), 2.4-2.7 (2H, m), 2.9-3.1 (2H, m), 3.8-4.0 (2H, m), 4.02 (2H, t, J=6.3Hz), 7.04 (2H, d, J=8.8Hz), 7.68 (2H, d, J=8.8Hz), 7.75 (2H, d, J=8.4Hz), 7.99 (2H, d, J=8.4Hz)

20 APCI-MASS : m/z = 440 (M+H⁺)

Preparation 339

Sodium hydride (60% suspension in mineral oil, 108 mg) was added to ethoxyethanol (10 ml), and the solution was stirred at 60°C for 20 minutes. To the solution was added Methyl 4-[4-(8-bromooctyloxy)phenyl]benzoate (1.26 g), and the reaction mixture was stirred at 70°C for 2 hours. To the reaction mixture was added 10% sodium hydroxide aqueous solution (2.4 ml), and the solution was stirred at 70°C for 1 hour. After cooling, the solution was adjusted to pH 2.0 with 1N hydrochloric acid. The precipitate was collected by filtration, and dried to give 4-[4-[8-(2-Ethoxyethoxy)octyloxy]phenyl]benzoic acid (1.13 g).

35 IR (KBr) : 2933, 2858, 1685, 1604, 1434, 1294, 1132 cm⁻¹

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NMR (DMSO- d_6 , δ) : 1.09 (3H, t, $J=7.0\text{Hz}$), 1.2-1.9
(14H, m), 3.2-3.6 (6H, m), 4.01 (2H, d, $J=6.3\text{Hz}$),
7.04 (2H, d, $J=8.8\text{Hz}$), 7.67 (2H, d, $J=8.8\text{Hz}$), 7.74
(2H, d, $J=8.5\text{Hz}$), 7.98 (2H, d, $J=8.5\text{Hz}$)

5 APCI-MASS : $m/z = 415$ ($M+H^+$)

The following compound was obtained according to a
similar manner to that of Preparation 300.

10 Preparation 340

4-n-Pentyloxybenzoylhydrazine

IR (KBr) : 3182, 2937, 2869, 1645, 1618, 1571,
1251 cm^{-1}

15 NMR (DMSO- d_6 , δ) : 0.89 (3H, d, $J=7.1\text{Hz}$), 1.2-1.8 (6H,
m), 4.00 (2H, t, $J=6.5\text{Hz}$), 4.41 (2H, s), 6.96 (2H,
d, $J=8.8\text{Hz}$), 7.78 (2H, d, $J=8.8\text{Hz}$), 9.59 (1H, s)

APCI-MASS : $m/z = 223$ ($M+H^+$)

20 The following compound was obtained according to a
similar manner to that of Preparation 291.

Preparation 341

1-(4-Methoxycarbonylbenzoyl)-2-(4-n-pentyloxybenzoyl)-
hydrazine

25 IR (KBr) : 3234, 2956, 2931, 1724, 1683, 1643, 1610,
1284, 1253 cm^{-1}

30 NMR (DMSO- d_6 , δ) : 0.90 (3H, t, $J=6.9\text{Hz}$), 1.2-1.5 (4H,
m), 1.6-1.8 (2H, m), 3.90 (3H, s), 4.04 (2H, t,
 $J=6.5\text{Hz}$), 7.04 (2H, d, $J=8.8\text{Hz}$), 7.90 (2H, d,
 $J=8.8\text{Hz}$), 8.03 (2H, d, $J=8.7\text{Hz}$), 8.10 (2H, d,
 $J=8.7\text{Hz}$), 10.42 (1H, s), 10.64 (1H, s)

APCI-MASS : $m/z = 385$ ($M+H^+$)

35 The following compound was obtained according to a
similar manner to that of Preparation 328.

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Preparation 342

Methyl 4-[5-(4-n-pentyloxyphenyl)thiadiazol-2-yl]benzoate

IR (KBr) : 2940, 2871, 1720, 1606, 1438, 1280 cm^{-1}

5 NMR (CDCl_3 , δ) : 0.95 (3H, t, $J=7.1\text{Hz}$), 1.3-1.6 (4H, m), 1.8-2.0 (2H, m), 3.96 (3H, s), 4.03 (2H, t, $J=6.5\text{Hz}$), 6.99 (2H, d, $J=8.8\text{Hz}$), 7.94 (2H, d, $J=8.8\text{Hz}$), 8.06 (2H, d, $J=8.7\text{Hz}$), 8.16 (2H, d, $J=8.7\text{Hz}$)

10 APCI-MASS : $m/z = 383$ ($M+H^+$)

The following compound was obtained according to a similar manner to that of Preparation 32

15 Preparation 343

4-[5-(4-n-Pentyloxyphenyl)thiadiazol-2-yl]benzoic acid

IR (KBr) : 2954, 2867, 1687, 1602, 1432, 1294, 1255 cm^{-1}

20 NMR ($\text{DMSO}-d_6$, δ) : 0.91 (3H, t, $J=7.0\text{Hz}$), 1.3-1.5 (4H, m), 1.7-1.9 (2H, m), 4.07 (2H, t, $J=6.7\text{Hz}$), 7.13 (2H, d, $J=8.8\text{Hz}$), 7.97 (2H, d, $J=8.8\text{Hz}$), 8.07 (4H, s)

APCI-MASS : $m/z = 369$ ($M+H^+$)

25 The following compound was obtained according to a similar manner to that of Preparation 49.

Preparation 344

30 1-[4-[5-(4-n-Pentyloxyphenyl)thiadiazol-2-yl]benzoyl]-benzotriazole 3-oxide

IR (KBr) : 2948, 2873, 1770, 1602, 1257, 1232 cm^{-1}

35 NMR (CDCl_3 , δ) : 0.95 (3H, t, $J=7.1\text{Hz}$), 1.3-1.6 (4H, m), 1.8-2.0 (2H, m), 4.04 (2H, t, $J=6.5\text{Hz}$), 7.01 (2H, d, $J=8.1\text{Hz}$), 7.4-7.7 (3H, m), 7.97 (2H, d, $J=8.1\text{Hz}$), 8.12 (1H, d, $J=8.2\text{Hz}$), 8.24 (2H, d,

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 $J=8.0\text{Hz}$), 8.40 (2H, d, $J=8.0\text{Hz}$)APCI-MASS : $m/z = 486$ ($M+H^+$)Preparation 345

5 To a solution of 4-bromobenzaldehyde oxime chloride (647 mg) and 4-n-pentyloxy-phenylacetylene (650 mg) in tetrahydrofuran (7 ml) was added triethylamine (0.5 ml) in tetrahydrofuran (5 ml) dropwise at 40°C. The solution was stirred at 40°C for 30 minutes, poured into water and
10 extracted with ethyl acetate. The organic layer was washed with H₂O, brine and dried over magnesium sulfate. The solvents were removed under reduced pressure and the residue was triturated with acetonitrile. The precipitate was collected by filtration and dried to give 4-[5-(4-n-pentyloxyphenyl)isoxazol-3-yl]bromobenzene (0.59 g).

IR (KBr) : 2948, 2867, 1612, 1430, 1255 cm^{-1}

NMR (CDCl₃, δ) : 0.95 (3H, t, $J=6.9\text{Hz}$), 1.3-1.6 (4H, m), 1.7-1.9 (2H, m), 4.01 (2H, t, $J=6.5\text{Hz}$), 6.66 (1H, s), 6.98 (2H, d, $J=8.8\text{Hz}$), 7.60 (2H, d, $J=8.6\text{Hz}$), 7.7-7.9 (4H, m)

APCI-MASS : $m/z = 388$ ($M+H^+$)Preparation 346

25 To a suspension of 4-[5-(4-n-pentyloxyphenyl)isoxazol-3-yl]bromobenzene (386 mg) in tetrahydrofuran (5 ml) was added 1.55M n-butyllithium in hexane (0.84 ml) at -40°C under N₂ stream and the solution was stirred for 1 hour at -40°C. To the solution was added crushed dryice (1 g) and the suspension was stirred for 1 hour at -40°C. The suspension
30 was diluted with H₂O, and acidified with 1N-hydrochloric acid. The precipitate was collected by filtration and dried to give 4-[5-(4-n-pentyloxyphenyl)isoxazol-3-yl]benzoic acid (312 mg).

IR (KBr) : 2939, 2867, 1681, 1614, 1429, 1255, 1178, 821 cm^{-1}

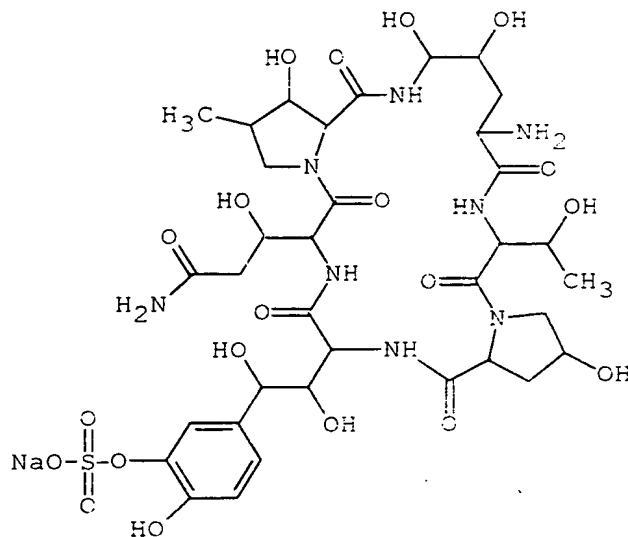
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NMR (DMSO-d₆, δ) : 0.91 (3H, t, J=7.1Hz), 1.3-1.5 (4H, m), 1.6-1.8 (2H, m), 4.04 (2H, t, J=6.5Hz), 7.11 (2H, d, J=8.9Hz), 7.54 (1H, s), 7.85 (2H, d, J=8.9Hz), 7.98 (2H, d, J=8.6Hz), 8.11 (2H, d, J=8.6Hz)

APCI-MASS : m/z = 352 (M+H⁺)

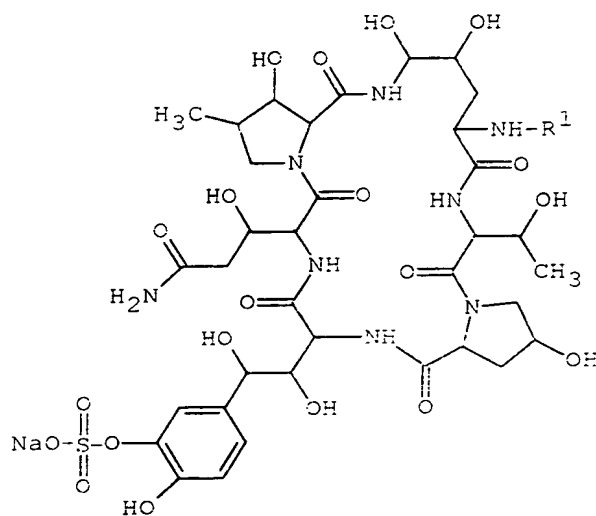
The Starting Compound in the following Examples 1 to 117 and The Object Compounds (1) to (122) and (124) in the following Examples 1 to 122 and 124 are illustrated by chemical formulae as below.

The Starting Compound
(the same in
Examples 1 to 117)



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The Object Compounds (1) to (122) and (124)



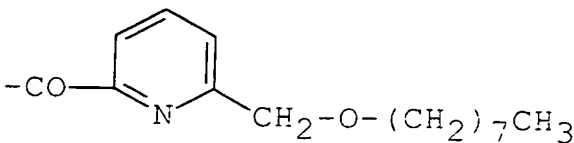
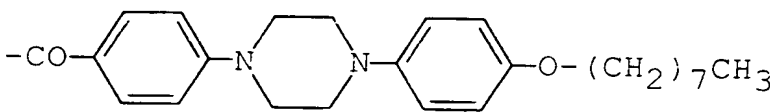
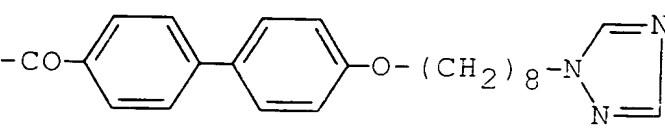
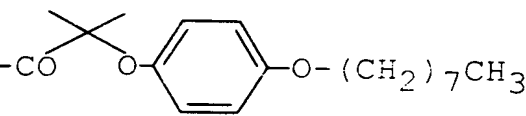
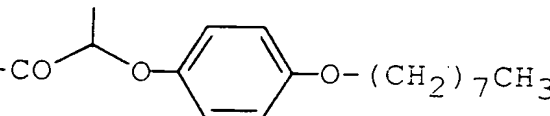
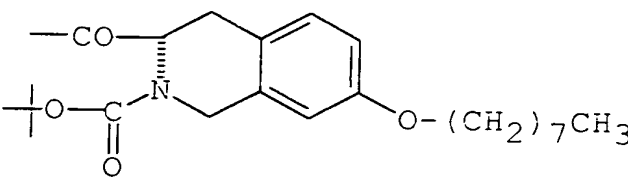
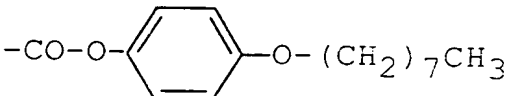
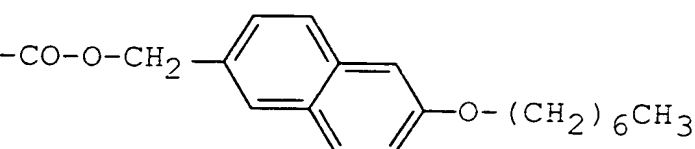
In the following Examples, The Object Compound (X) [e.g. The Object Compound (1)] means the object compound of Example (X) [e.g. Example (1)].

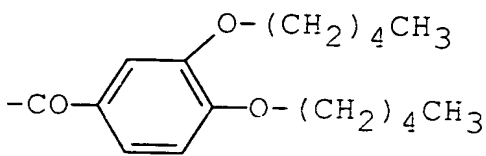
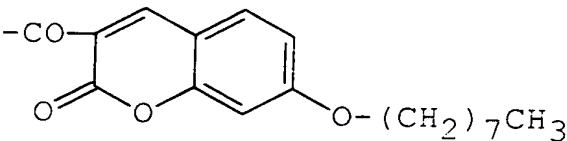
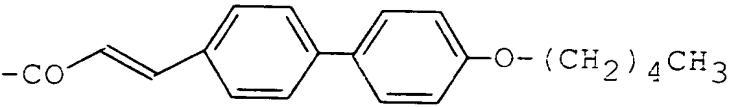
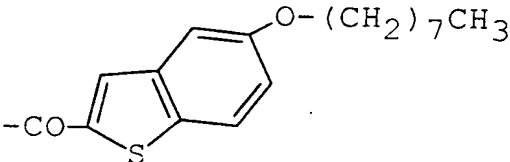
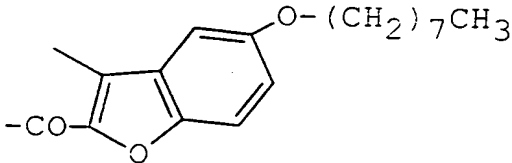
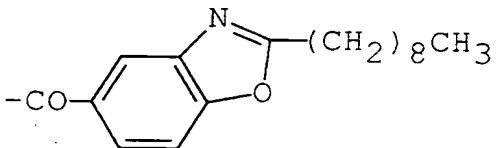
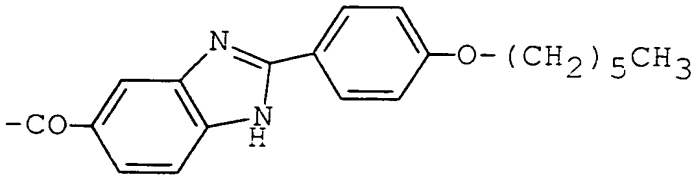
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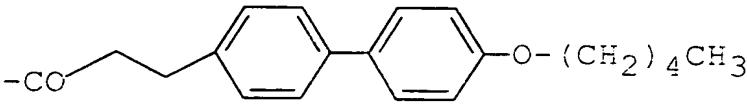
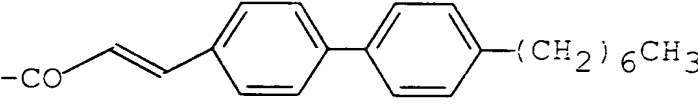
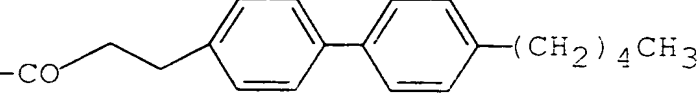
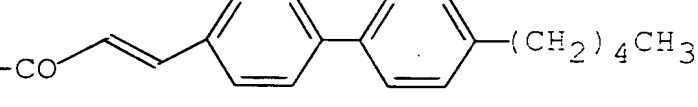
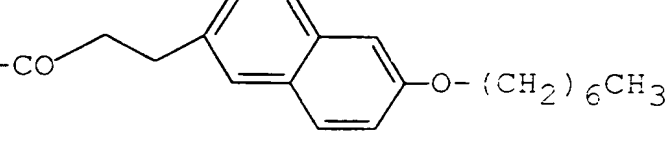
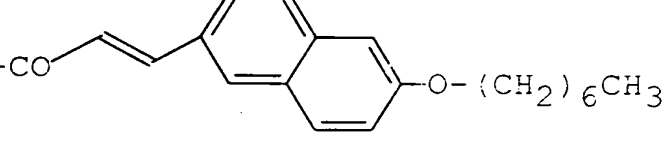
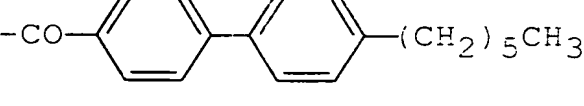
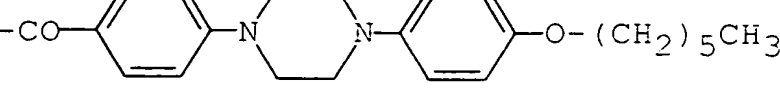
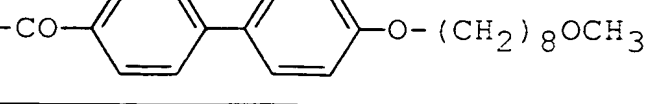
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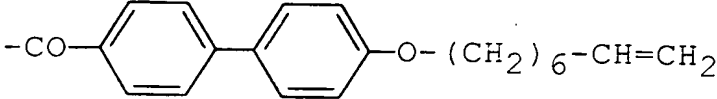
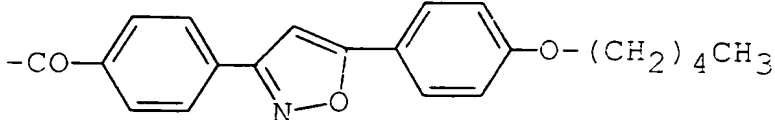
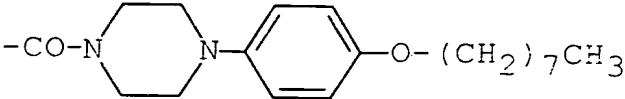
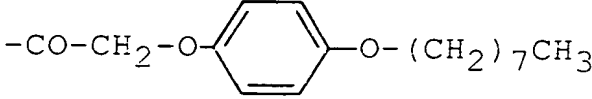
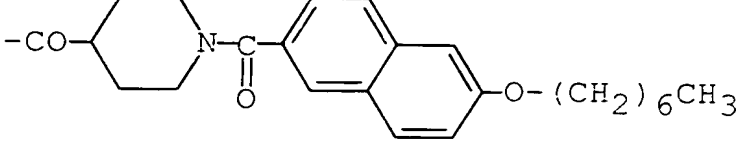
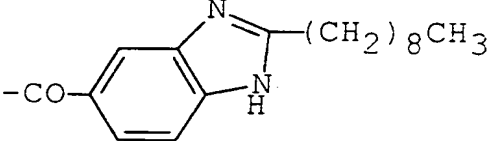
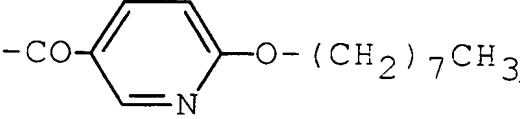
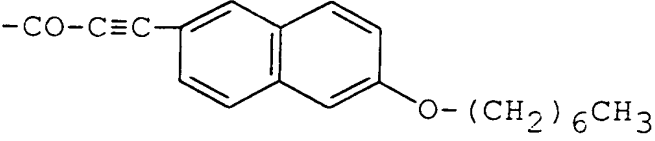
35

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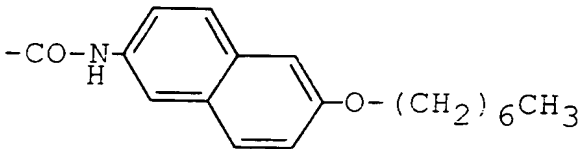
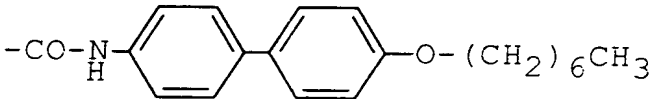
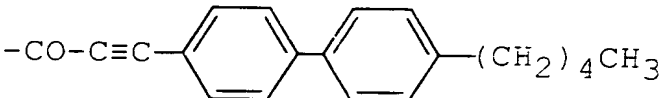
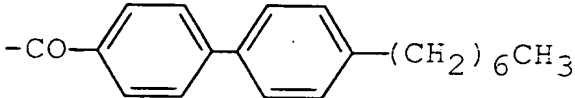
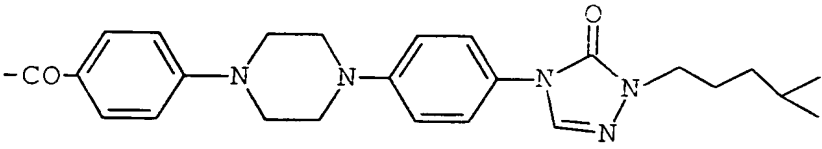
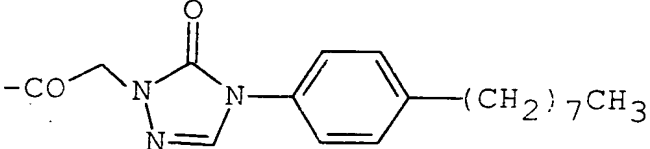
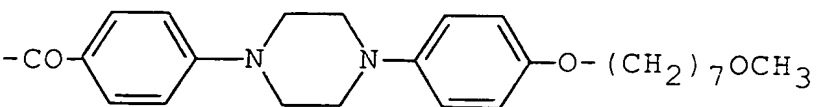
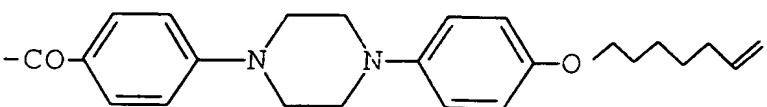
Example No.	R ¹
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Example No.	R ¹
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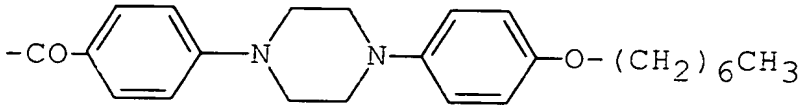
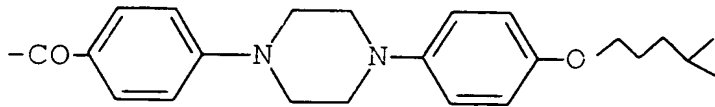
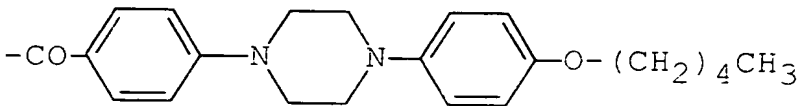
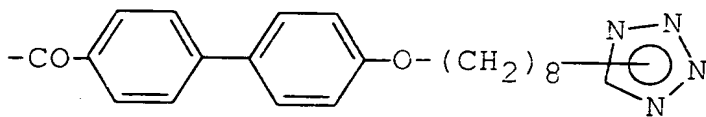
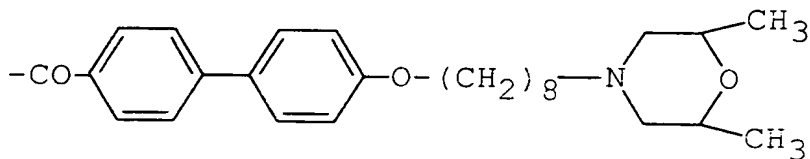
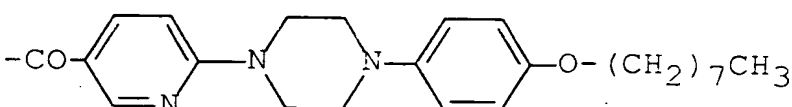
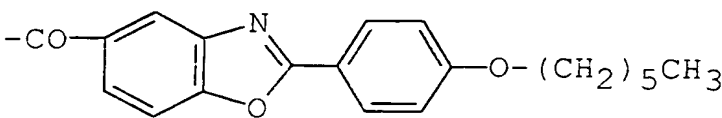
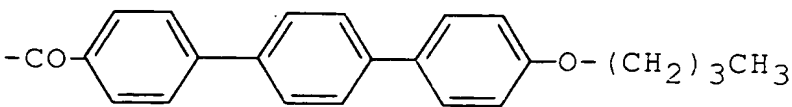
Example No.	R ¹
16	
17	
18	
19	
20	
21	
22	
23	
24 major product	

Example No.	R ¹
24 minor product	
25	
26	
27	
28	
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31	

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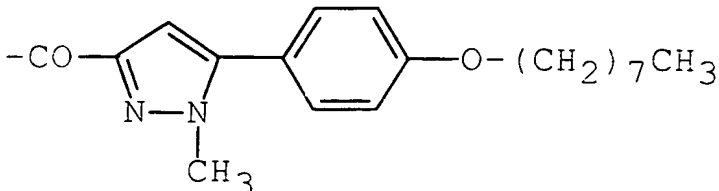
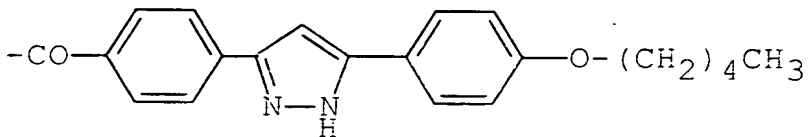
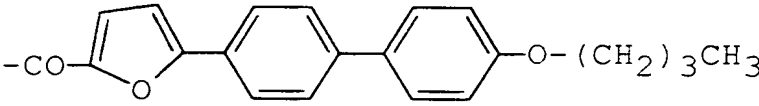
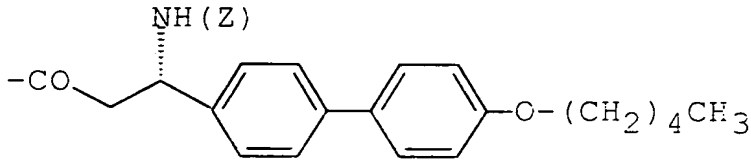
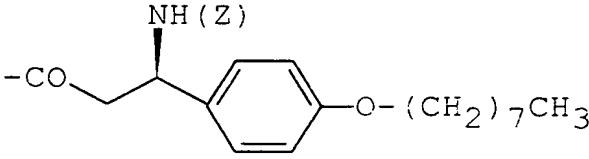
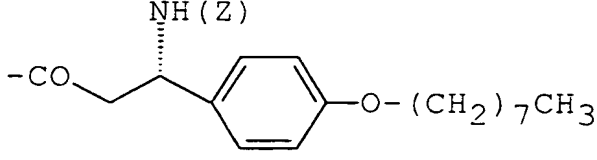
Example No.	R ¹
32	
33	
34	
35	
36	
37	
38 major product	
38 minor product	

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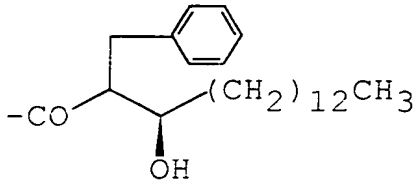
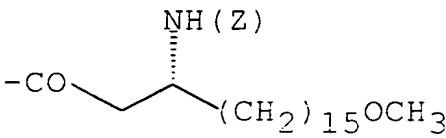
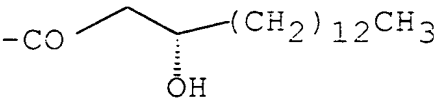
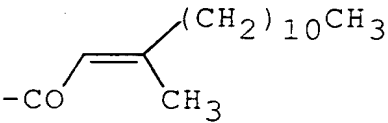
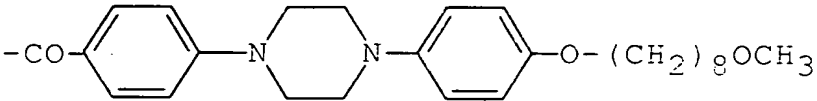
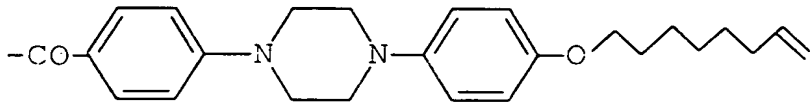
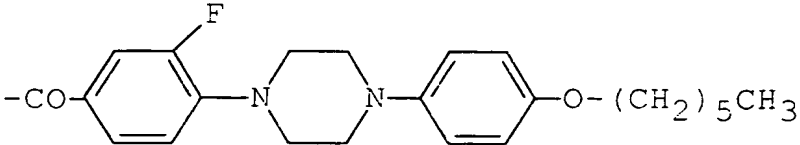
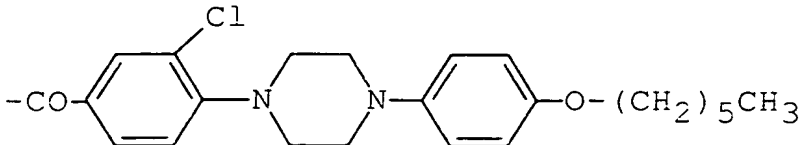
Example No.	R ¹
39	
40	
41	
42 mixture product	
43	
44	
45	
46	

Example No.	R ¹
47	
48	
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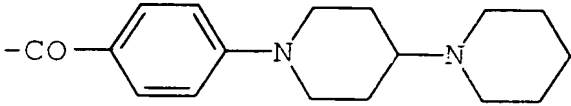
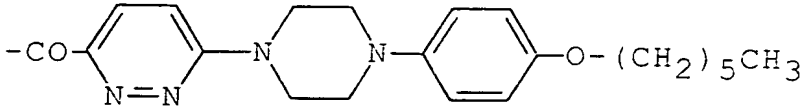
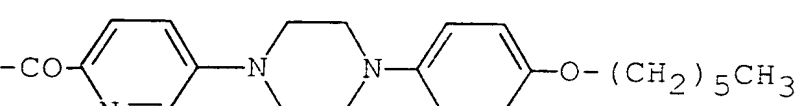
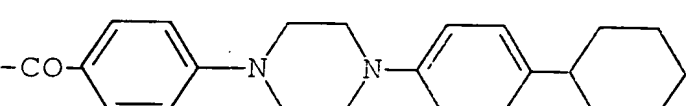
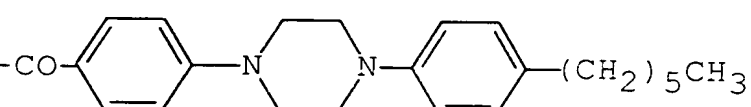
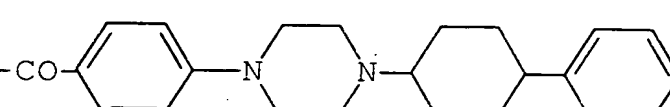
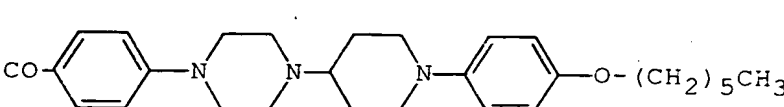
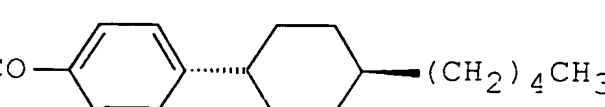
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Example No.	R ¹
54	
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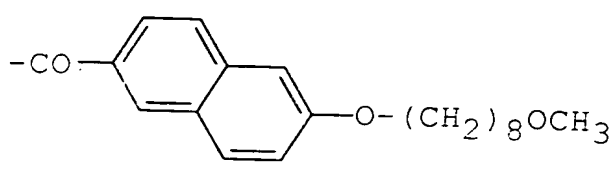
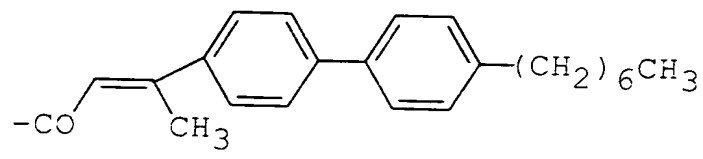
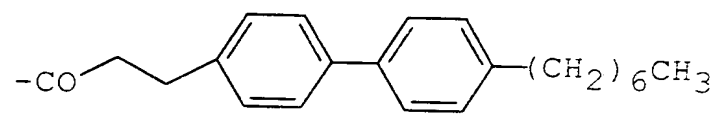
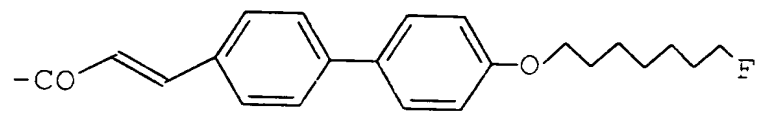
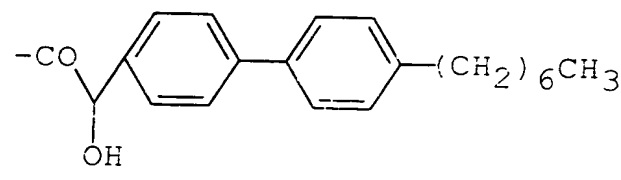
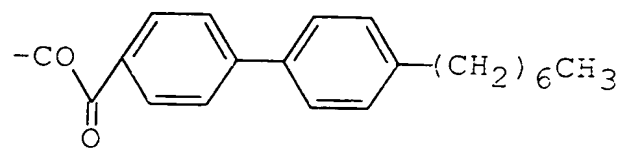
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Example No.	R ¹
60	
61	
62	
63	
64 major product	
64 minor product	
65	
66	

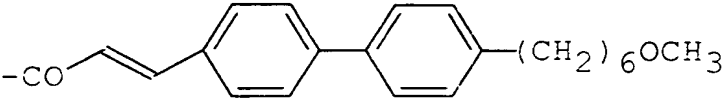
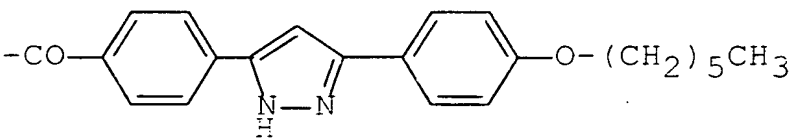
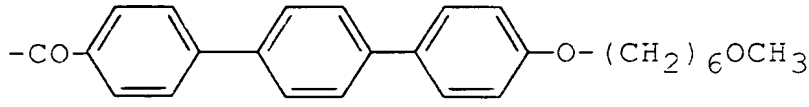
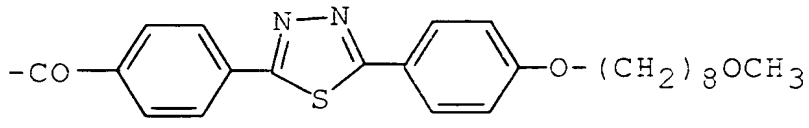
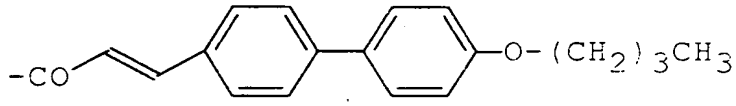
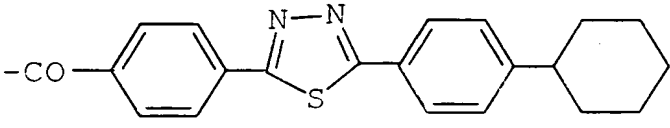
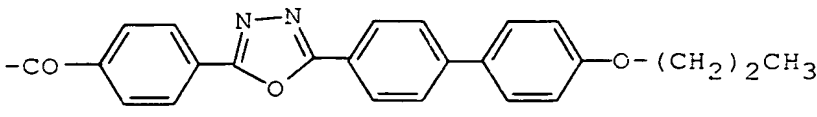
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Example No.	R ¹
67	
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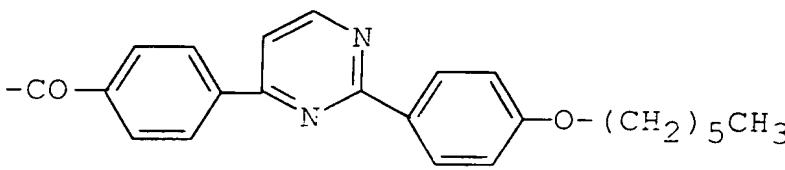
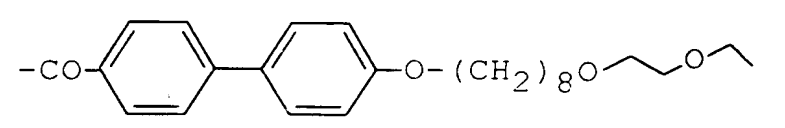
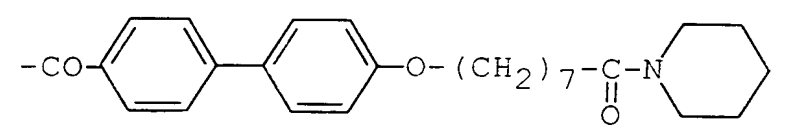
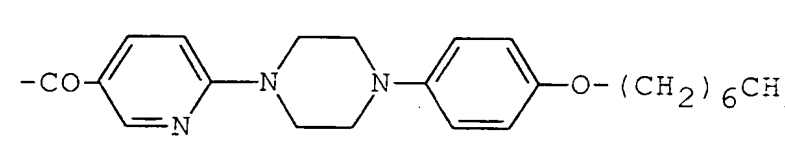
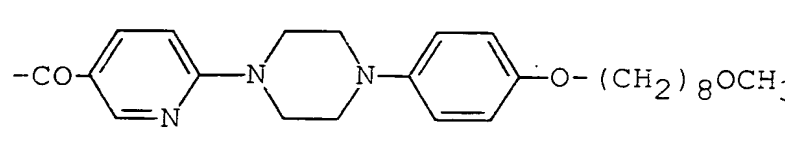
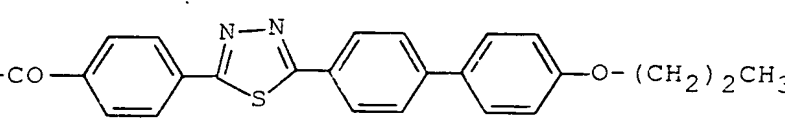
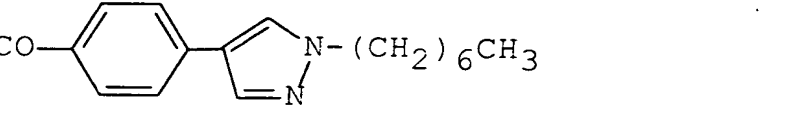
Example No.	R ¹
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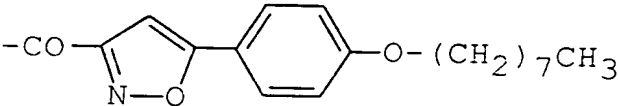
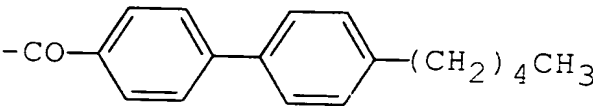
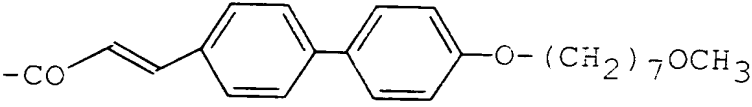
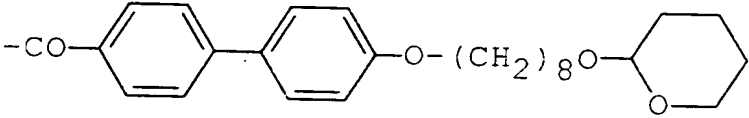
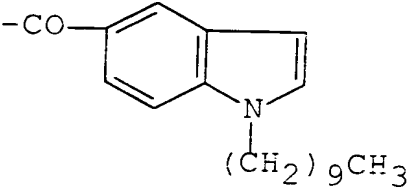
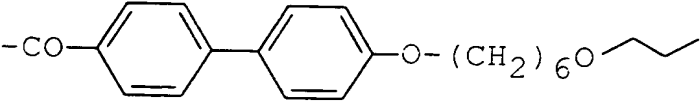
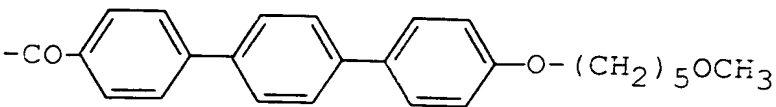
Example No.	R ¹
81	
82	
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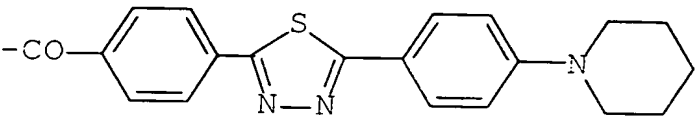
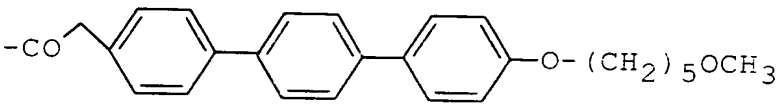
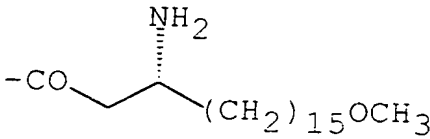
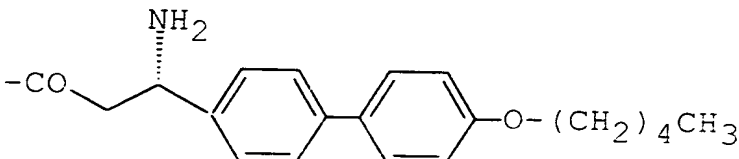
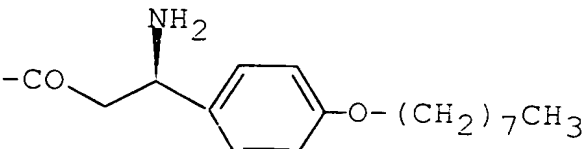
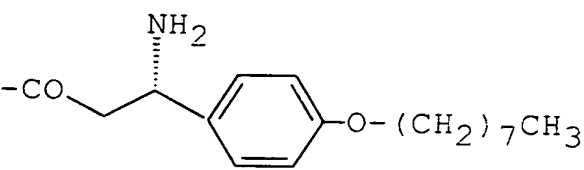
Example No.	R ¹
87	
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Example No.	R ¹
94	
95	
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100	
101	

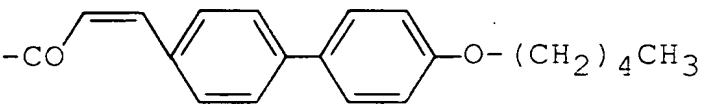
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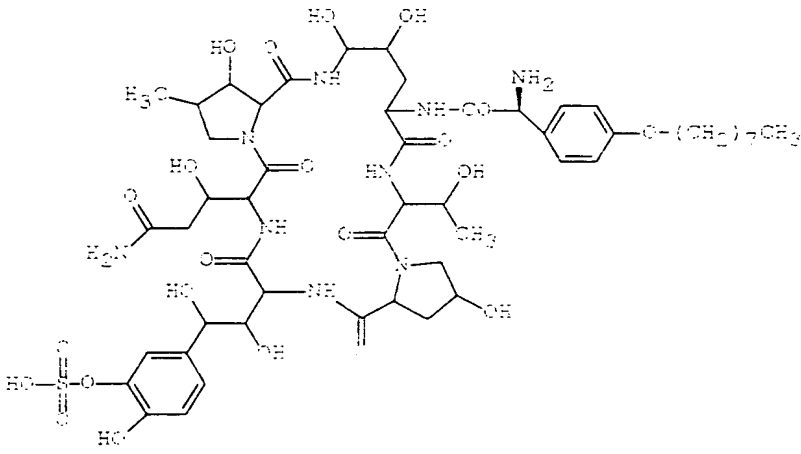
Example No.	R^1
102	
103	
104	
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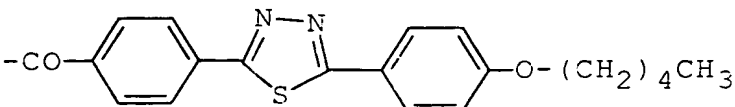
Example No.	R ¹
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Example No.	R^1
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Example No.	R ¹
122	

Example No.	The Object Compound
123	

Example No.	R ¹
124	

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Example 1

To a solution of The Starting Compound (1 g) and 1-(6-octyl-oxymethylpicolinoyl)benzotriazole 3-oxide (0.399 g) in N,N-dimethylformamide (10 ml) was added 4-(N,N-dimethylamino)pyridine (0.140 g), and stirred for 12 hours at ambient temperature. The reaction mixture was pulverized with ethyl acetate. The precipitate was collected by filtration, and dried under reduced pressure. The powder was dissolved in water, and subjected to column chromatography on ion exchange resin (DOWEX-50WX4 (Trademark : prepared by Dow Chemical)) eluting with water. The fractions containing the object compound were combined, and subjected to column chromatography on ODS (YMC-gel-ODS-AM-S-50) (Trademark : prepared by Yamamura Chemical Lab.) eluting with 50% methanol aqueous solution. The fractions containing the object compound were combined, and evaporated under reduced pressure to remove methanol. The residue was lyophilized to give The Object Compound (1).

IR (KBr) : 3347, 1664, 1629, 1517 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.7\text{Hz}$), 0.98 (3H, d, $J=6.7\text{Hz}$), 1.09 (3H, d, $J=6.0\text{Hz}$), 1.2-1.47 (10H, m), 1.47-1.67 (2H, m), 1.67-2.06 (3H, m), 2.06-2.5 (4H, m), 3.19 (1H, m), 3.53 (2H, t, $J=6.4\text{Hz}$), 3.5-3.85 (2H, m), 3.85-4.7 (13H, m), 5.35 (11H, m), 5.56 (1H, d, $J=5.7\text{Hz}$), 6.73 (1H, d, $J=8.3\text{Hz}$), 6.83 (1H, d, $J=8.3\text{Hz}$), 6.89 (1H, s), 7.05 (1H, s), 7.11 (1H, s), 7.32 (1H, m), 7.43 (1H, d, $J=8.5\text{Hz}$), 7.63 (1H, d, $J=7.3\text{Hz}$), 7.85-8.13 (4H, m), 8.66 (1H, d, $J=7.8\text{Hz}$), 8.84 (1H, s)

FAB-MASS : $m/z = 1228$ ($M^+ + \text{Na}$)

Elemental Analysis Calcd. for $\text{C}_{50}\text{H}_{72}\text{N}_9\text{O}_{22}\text{SNa} \cdot 6\text{H}_2\text{O}$:

C 45.49, H 6.44, N 9.59

Found : C 45.89, H 6.52, N 9.69

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The Object Compounds (2) to (25) were obtained according to a similar manner to that of Example 1.

Example 2

5 IR (KBr) : 3353, 1666, 1510, 1236 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.7\text{Hz}$), 0.96 (3H, d, $J=6.7\text{Hz}$), 1.06 (3H, d, $J=5.8\text{Hz}$), 1.2-1.5 (10H, m), 1.55-2.05 (5H, m), 2.11-2.7 (4H, m), 3.0-3.3 (5H, m), 3.3-3.5 (4H, m), 3.6-4.5 (15H, m), 4.6-5.6 (12H, m), 6.6-7.2 (10H, m), 7.2-7.5 (3H, m), 7.81 (2H, d, $J=8.8\text{Hz}$), 8.05 (1H, d, $J=8.7\text{Hz}$), 8.28 (1H, d, $J=8.7\text{Hz}$), 8.41 (1H, d, $J=6.7\text{Hz}$), 8.84 (1H, s)

FAB-MASS : $m/z = 1373$ ($M^+ + \text{Na}$)

15 Elemental Analysis Calcd. for $\text{C}_{60}\text{H}_{83}\text{N}_{10}\text{O}_{22}\text{SNa} \cdot 4\text{H}_2\text{O}$:
C 50.63, H 6.44, N 9.84
Found : C 50.59, H 6.59, N 9.79

Example 3

20 IR (KBr) : 3350, 1664, 1627, 1047 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.96 (3H, d, $J=6.6\text{Hz}$), 1.08 (3H, d, $J=5.7\text{Hz}$), 1.15-1.53 (8H, m), 1.55-2.1 (9H, m), 2.1-2.45 (3H, m), 2.5-2.7 (1H, m), 3.18 (1H, m), 3.6-3.83 (2H, m), 3.83-4.6 (17H, m), 4.7-5.4 (11H, m), 5.51 (1H, d, $J=5.9\text{Hz}$), 6.73 (1H, d, $J=8.2\text{Hz}$), 6.83 (1H, d, $J=8.2\text{Hz}$), 6.85 (1H, s), 7.03 (2H, d, $J=8.4\text{Hz}$), 7.05 (1H, s), 7.30 (1H, s), 7.2-7.5 (2H, m), 7.67 (2H, d, $J=8.4\text{Hz}$), 7.71 (2H, d, $J=7.4\text{Hz}$), 7.94 (1H, s), 7.96 (2H, d, $J=7.4\text{Hz}$), 8.06 (1H, d, $J=8.0\text{Hz}$), 8.25 (1H, d, $J=6.7\text{Hz}$), 8.50 (1H, s), 8.74 (1H, d, $J=6.7\text{Hz}$), 8.84 (1H, s)

FAB-MASS : $m/z = 1356$ ($M^+ + \text{Na}$)

35 Elemental Analysis Calcd. for $\text{C}_{58}\text{H}_{76}\text{N}_{11}\text{O}_{22}\text{SNa} \cdot 4\text{H}_2\text{O}$:
C 49.53, H 6.02, N 10.95

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Found : C 49.26, H 6.22, N 10.77

Example 4IR (KBr) : 3350, 1660, 1631, 1047 cm^{-1}

5 NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.9\text{Hz}$), 0.97 (3H, d, $J=6.6\text{Hz}$), 1.09 (3H, d, $J=5.3\text{Hz}$), 1.2-1.5 (10H, m), 1.37 (6H, s), 1.55-2.0 (5H, m), 2.1-2.6 (4H, m), 3.16 (1H, m), 3.73 (2H, m), 3.89 (2H, t, $J=6.3\text{Hz}$), 3.95-4.49 (11H, m), 4.68-5.21 (10H, m), 5.25 (1H, d, $J=4.1\text{Hz}$), 5.53 (1H, d, $J=5.7\text{Hz}$), 6.73 (1H, d, $J=8.2\text{Hz}$), 6.75-6.85 (4H, m), 6.91 (1H, d, $J=8.2\text{Hz}$), 7.05 (1H, s), 7.15 (1H, s), 7.3-7.5 (2H, m), 7.9-8.2 (3H, m), 8.84 (1H, s)

15 FAB-MASS : $m/z = 1271$ ($\text{M}^+ + \text{Na}$)

Elemental Analysis Calcd. For $\text{C}_{53}\text{H}_{77}\text{N}_8\text{O}_{23}\text{SNa} \cdot 4\text{H}_2\text{O}$:

C 48.18, H 6.48, N 8.48

Found : C 48.04, H 6.51, N 8.38

20 Example 5

IR (KBr) : 1666, 1629, 1222 cm^{-1}

25 NMR (DMSO- d_6 , δ) : 0.85 (3H, t, $J=6.6\text{Hz}$), 0.9-1.12 (6H, m), 1.12-1.52 (13H, m), 1.52-1.93 (5H, m), 2.08-2.55 (4H, m), 3.16 (1H, m), 3.6-5.3 (26H, m), 5.49 + 5.54 (1H, d, $J=5.8\text{Hz}$, mixture of diastereomer), 6.60-7.1 (7H, m), 7.04 (1H, s), 7.1 (1H, m), 7.2-7.5 (2H, m), 7.9-8.43 (3H, m), 8.83 (1H, s)

FAB-MASS : $m/z = 1257$ ($\text{M}^+ + \text{Na}$)

30 Elemental Analysis Calcd. for $\text{C}_{52}\text{H}_{75}\text{N}_8\text{O}_{23}\text{SNa} \cdot 3\text{H}_2\text{O}$:

C 48.44, H 6.33, N 8.69

Found : C 48.16, H 6.51, N 8.53

Example 6

35 IR (KBr) : 3349, 1666, 1629, 1259 cm^{-1}

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NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.7\text{Hz}$), 0.9 (3H, d, $J=5.7\text{Hz}$), 0.96 (3H, d, $J=6.7\text{Hz}$), 1.1-1.55 (19H, m), 1.55-2.0 (5H, m), 2.0-2.47 (4H, m), 2.65-3.25 (3H, m), 3.5-5.13 (27H, m), 5.17 (1H, d, $J=3.2\text{Hz}$), 5.24 (1H, d, $J=4.5\text{Hz}$), 5.38 (1H, d, $J=5.9\text{Hz}$), 6.5-6.9 (5H, m), 6.9-7.1 (3H, m), 7.2-7.46 (2H, m), 7.7-8.1 (3H, m), 8.83 (1H, s)

FAB-MASS : $m/z = 1368$ ($M^+ + \text{Na}$)

Elemental Analysis Calcd. for $\text{C}_{58}\text{H}_{84}\text{N}_9\text{O}_{24}\text{SNa}\cdot 5\text{H}_2\text{O}$:

C 48.50, N 6.60, N 8.78

Found : C 48.47, H 6.83, N 8.78

Example 7

IR (KBr) : 3350, 1666, 1502, 1199 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.6\text{Hz}$), 0.97 (3H, d, $J=6.7\text{Hz}$), 1.06 (3H, d, $J=5.7\text{Hz}$), 1.2-1.5 (10H, m), 1.55-2.0 (5H, m), 2.1-2.6 (4H, m), 3.17 (1H, m), 3.7-4.5 (15H, m), 4.7-5.22 (10H, m), 5.24 (1H, d, $J=4.4\text{Hz}$), 5.60 (1H, d, $J=5.9\text{Hz}$), 6.68-7.03 (8H, m), 7.04 (1H, s), 7.2-7.42 (2H, m), 7.85-8.1 (3H, m), 8.83 (1H, s)

FAB-MASS : $m/z = 1229$ ($M^+ + \text{Na}$)

Elemental Analysis Calcd. for $\text{C}_{50}\text{H}_{71}\text{N}_8\text{O}_{23}\text{SNa}\cdot 5\text{H}_2\text{O}$:

C 46.29, H 6.29, N 8.64

Found : C 46.39, H 6.05, N 8.72

Example 8

IR (KBr) : 3350, 1666, 1631, 1513 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.88 (3H, t, $J=6.2\text{Hz}$), 0.97 (3H, d, $J=6.7\text{Hz}$), 1.04 (3H, d, $J=5.7\text{Hz}$), 1.2-1.58 (8H, m), 1.58-2.0 (5H, m), 2.0-2.6 (4H, m), 3.17 (1H, m), 3.6-4.5 (15H, m), 4.63-5.33 (13H, m), 5.53 (1H, d, $J=5.9\text{Hz}$), 6.73 (1H, d, $J=8.2\text{Hz}$), 6.82 (1H, d, $J=8.2\text{Hz}$), 6.84 (1H, s), 6.95-7.52 (7H, m), 7.66 (1H, d, $J=7.6\text{Hz}$), 7.7-7.9 (3H, m),

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8.05 (1H, d, J=9.1Hz), 8.15 (1H, d, J=7.6Hz),
8.85 (1H, s)

FAB-MASS : m/z = 1279 (M⁺+Na)

Elemental Analysis Calcd. for C₅₄H₇₃N₈O₂₃SNa·5H₂O :

C 48.14, H 6.21, N 8.32

Found : C 48.43, H 6.28, N 8.30

Example 9

IR (KBr) : 3347, 2956, 1664, 1633, 1508, 1444, 1268,
1047 cm⁻¹

NMR (DMSO-d₆, δ) : 0.9-1.1 (9H, m), 1.06 (3H, d,
J=5.9Hz), 1.3-1.5 (8H, m), 1.6-2.0 (7H, m), 2.1-
2.4 (3H, m), 2.5-2.6 (1H, m), 3.1-3.3 (1H, m),
3.6-4.4 (17H, m), 4.7-5.0 (8H, m), 5.09 (1H, d,
J=5.5Hz), 5.16 (1H, d, J=3.1Hz), 5.24 (1H, d,
J=4.5Hz), 6.73 (1H, d, J=8.2Hz), 6.8-6.9 (2H,
m), 6.98 (1H, d, J=8.3Hz), 7.05 (1H, d,
J=1.7Hz), 7.3-7.6 (5H, m), 8.08 (1H, d,
J=8.9Hz), 8.25 (1H, d, J=8.4Hz), 8.54 (1H, d,
J=7.5Hz), 8.83 (1H, s)

FAB-MASS : m/z = 1257 (M⁺+Na)

Elemental Analysis Calcd. for C₅₂H₇₅N₈O₂₃SNa·4H₂O :

C 47.78, H 6.40, N 8.57

Found : C 47.88, H 6.71, N 8.53

Example 10

IR (KBr) : 3350, 2931, 1664, 1625, 1529, 1440, 1276,
1226, 1047 cm⁻¹

NMR (DMSO-d₆, δ) : 0.86 (3H, t, J=6.8Hz), 0.97 (3H,
d, J=6.7Hz), 1.12 (3H, d, J=5.9Hz), 1.2-1.5
(10H, m), 1.6-2.1 (5H, m), 2.1-2.4 (4H, m), 3.1-
3.3 (1H, m), 3.5-4.6 (15H, m), 4.7-5.0 (3H, m),
5.0-5.2 (7H, m), 5.27 (1H, d, J=4.4Hz), 5.55
(1H, d, J=5.7Hz), 6.73 (1H, d, J=8.2Hz), 6.8-7.0
(2H, m), 7.0-7.2 (4H, m), 7.3-7.6 (2H, m), 7.90

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(1H, d, J=8.8Hz), 8.0-8.2 (2H, m), 8.8-8.9 (2H, m), 9.06 (1H, d, J=7.2Hz)

FAB-MASS : m/z = 1281 (M⁺+Na)

Elemental Analysis Calcd. for C₅₃H₇₁N₈O₂₄SNa·5H₂O :

5 C 47.18, H 6.05, N 8.30

Found : C 46.97, H 6.27, N 8.22

Example 11

10 NMR (DMSO-d₆, δ) : 0.87-1.05 (6H, m), 1.10 (3H, d, J=5.7Hz), 1.3-1.5 (4H, m), 1.6-1.9 (5H, m), 2.2-2.5 (3H, m), 2.6 (1H, m), 3.1-3.2 (1H, m), 3.7-4.5 (15H, m), 4.8-5.1 (8H, m), 5.09 (1H, d, J=5.64Hz), 5.16 (1H, d, J=3.2Hz), 5.26 (1H, d, J=4.2Hz), 5.52 (1H, d, J=6.0Hz), 6.73 (2H, d, J=8.4Hz), 6.8-6.9 (2H, m), 7.0-7.1 (3H, m), 7.2-7.4 (4H, m), 7.6-7.8 (6H, m), 8.11 (1H, d, J=8.4Hz), 8.29 (1H, d, J=8.4Hz), 8.51 (1H, d, J=7.7Hz), 8.85 (1H, s)

FAB-MASS : m/z = 1273 (M⁺+Na)

20 Elemental Analysis Calcd. for C₅₅H₇₁N₈O₂₂SNa·4H₂O :

C 49.92, H 6.02, N 8.47

Found : C 49.79, H 6.14, N 8.45

Example 12

25 IR (KBr) : 3330, 2929, 1670, 1629, 1533, 1440, 1280, 1226, 1045, 804 cm⁻¹

30 NMR (DMSO-d₆, δ) : 0.86 (3H, t, J=6.7Hz), 0.97 (3H, d, J=6.7Hz), 1.08 (3H, d, J=5.9Hz), 1.2-1.6 (10H, m), 1.6-2.0 (5H, m), 2.1-2.5 (4H, m), 3.1-3.3 (1H, m), 3.6-4.5 (15H, m), 4.8-5.1 (9H, m), 5.17 (1H, d, J=3.0Hz), 5.25 (1H, d, J=4.5Hz), 5.56 (1H, d, J=5.6Hz), 6.73 (1H, d, J=8.2Hz), 6.83 (1H, d, J=6.8Hz), 7.1-7.2 (3H, m), 7.3-7.5 (3H, m), 7.85 (1H, d, J=8.8Hz), 8.0-8.2 (3H, m), 8.84 (1H, s), 8.96 (1H, d, J=7.2Hz)

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FAB-MASS : $m/z = 1269$ ($M^+ + Na$)Elemental Analysis Calcd. for $C_{52}H_{71}N_8O_{22}S_2Na \cdot 4H_2O$:

C 47.34, H 6.04, N 8.49

Found : C 47.21, H 5.96, N 8.41

5

Example 13IR (KBr) : 3345, 2927, 1664, 1629, 1515, 1442,
1274, 1047 cm^{-1}

10 NMR (DMSO- d_6 , δ) : 0.85 (3H, t, $J=6.7Hz$), 0.97 (3H,
d, $J=6.7Hz$), 1.10 (3H, d, $J=5.9Hz$), 1.2-1.4
(10H, m), 1.5-2.5 (8H, m), 2.46 (3H, s), 2.69
(2H, t, $J=7.7Hz$), 3.1-3.4 (2H, m), 3.6-4.5 (17H,
m), 4.8-5.2 (8H, m), 6.7-7.0 (3H, m), 7.05 (1H,
d, $J=1.7Hz$), 7.14 (1H, s), 7.3-7.6 (5H, m), 8.0-
15 8.2 (2H, m), 8.47 (1H, d, $J=7.0Hz$), 8.84 (1H, s)

FAB-MASS : $m/z = 1251$ ($M^+ + Na$)Elemental Analysis Calcd. for $C_{53}H_{73}N_8O_{22}SNa \cdot 3H_2O$:

C 49.61, H 6.21, N 8.73

Found : C 49.88, H 6.44, N 8.74

20

Example 14IR (KBr) : 3340, 1672, 1627, 1542, 1513, 1440, 1268,
1045 cm^{-1}

25 NMR (DMSO- d_6 , δ) : 0.84 (3H, t, $J=6.7Hz$), 0.94 (3H,
d, $J=6.7Hz$), 1.07 (3H, d, $J=6.0Hz$), 1.2-1.4
(12H, m), 1.6-2.0 (5H, m), 2.1-2.4 (3H, m), 2.6
(1H, m), 2.96 (2H, t, $J=7.4Hz$), 3.1-3.3 (1H, m),
3.6-4.5 (13H, m), 4.7-5.2 (11H, m), 5.50 (1H, d,
 $J=5.7Hz$), 6.73 (1H, d, $J=8.2Hz$), 6.8-6.9 (2H,
30 m), 7.04 (1H, s), 7.2-7.5 (3H, m), 7.72 (1H, d,
 $J=8.5Hz$), 7.91 (1H, d, $J=8.4Hz$), 8.05 (1H, d,
 $J=8.4Hz$), 8.2-8.4 (1H, m), 8.80 (1H, d,
 $J=7.7Hz$), 8.83 (1H, s)

FAB-MASS : $m/z = 1252$ ($M^+ + Na$)35 Elemental Analysis Calcd. for $C_{52}H_{72}N_9O_{22}SNa \cdot 6H_2O$:

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C 46.67, H 6.33, N 9.42

Found : C 46.72, H 6.53, N 9.45

Example 15

5 IR (KBr) : 3350, 2935, 1664, 1627, 1517, 1446, 1251,
1045 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.90-1.1 (6H, m), 1.10 (3H, d,
J=5.9Hz), 1.2-1.4 (6H, m), 1.6-2.4 (8H, m), 2.6-
2.7 (1H, m), 3.1-3.3 (1H, m), 3.7-4.5 (16H, m),
10 4.7-5.4 (11H, m), 5.51 (1H, d, J=5.6Hz), 6.7-7.0
(3H, m), 7.0-7.6 (7H, m), 7.74 (1H, d, J=8.6Hz),
8.0-8.4 (5H, m), 8.7-8.8 (1H, m), 8.84 (1H, s)

FAB-MASS : $m/z = 1301$ ($M^+ + \text{Na}$)Elemental Analysis Calcd. for $\text{C}_{55}\text{H}_{71}\text{N}_{10}\text{O}_{22}\text{SNa} \cdot 6\text{H}_2\text{O}$:

15 C 47.62, H 6.03, N 10.01

Found : C 47.65, H 6.03, N 10.03

Example 16

IR (Nujol) : 3353, 1668, 1627, 1540, 1515, 1500 cm^{-1}

20 NMR (DMSO- d_6 , δ) : 0.80-1.00 (6H, m), 1.06 (3H, d,
J=5.9Hz), 1.20-1.53 (4H, m), 1.60-1.95 (5H, m),
2.00-2.65 (8H, m), 2.80 (2H, t, J=7.5Hz), 3.05-
3.45 (1H, m), 3.50-3.85 (2H, m), 3.90-4.48 (11H,
m), 4.65-5.38 (11H, m), 5.47 (1H, d, J=6.0Hz),
25 6.65-6.90 (2H, m), 6.90-7.10 (2H, m), 7.10-7.65
(11H, m), 7.90-8.25 (2H, m), 8.30 (1H, d,
J=7.8Hz), 8.84 (1H, s)

FAB-MASS : $m/z = 1275.3$ ($M^+ + \text{Na}$)Elemental Analysis Calcd. for $\text{C}_{55}\text{H}_{73}\text{N}_8\text{O}_{22}\text{SNa} \cdot 3\text{H}_2\text{O}$:

30 C 50.53, H 6.09, N 8.57

Found : C 50.48, H 6.39, N 8.57

Example 17

IR (Nujol) : 3351, 1656, 1623, 1538, 1515 cm^{-1}

35 NMR (DMSO- d_6 , δ) : 0.86 (3H, t, J=6.7Hz), 0.96 (3H,

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d, J=6.7Hz), 1.08 (3H, d, J=5.8Hz), 1.15-1.40
(8H, m), 1.50-2.00 (5H, m), 2.10-2.48 (4H, m),
2.52-2.70 (2H, m), 3.05-3.28 (1H, m), 3.60-4.50
(13H, m), 4.70-5.20 (9H, m), 5.25 (1H, d,
5 J=4.6Hz), 5.52 (1H, d, J=6.0Hz), 6.68-6.92 (4H,
m), 7.04 (1H, d, J=1.0Hz), 7.22-7.50 (5H, m),
7.55-7.82 (7H, m), 8.14 (1H, d, J=8.4Hz), 8.31
(1H, d, J=8.4Hz), 8.54 (1H, d, J=7.7Hz), 8.84
(1H, s)
10 FAB-MASS : m/z = 1285 (M⁺+Na)

Example 18

IR (Nujol) : 3351, 1668, 1627, 1540, 1515 cm⁻¹
NMR (DMSO-d₆, δ) : 0.87 (3H, t, J=6.8Hz), 0.96 (3H,
15 d, J=6.7Hz), 1.06 (3H, d, J=5.8Hz), 1.17-1.48
(4H, m), 1.50-1.95 (5H, m), 2.05-2.70 (8H, m),
2.70-2.95 (2H, m), 3.05-3.30 (1H, m), 3.60-3.90
(2H, m), 3.90-4.50 (11H, m), 4.65-5.10 (9H, m),
5.15 (1H, d, J=3.2Hz), 5.23 (1H, d, J=4.2Hz),
20 5.48 (1H, d, J=6.0Hz), 6.67-6.90 (3H, m), 7.03
(1H, d, J=1.5Hz), 7.15-7.80 (11H, m), 8.00-8.20
(2H, m), 8.29 (1H, d, J=7.8Hz), 8.84 (1H, s)
FAB-MASS : m/z = 1259 (M⁺+Na)
Elemental Analysis Calcd. for C₅₅H₇₃N₈O₂₁SNa·6H₂O :
25 C 50.30, H 6.52, N 8.53
Found : C 50.42, H 6.50, N 8.45

Example 19

IR (Nujol) : 3351, 1668, 1652, 1623, 1540 cm⁻¹
30 NMR (DMSO-d₆, δ) : 0.87 (3H, t, J=6.7Hz), 0.96 (3H,
d, J=6.7Hz), 1.07 (3H, d, J=6.0Hz), 1.25-1.45
(4H, m), 1.50-2.00 (5H, m), 2.05-2.48 (4H, m),
2.50-2.75 (2H, m), 3.60-4.50 (13H, m), 4.68-5.25
(10H, m), 5.27 (1H, d, J=4.5Hz), 5.53 (1H, d,
35 J=6.0Hz), 6.67-6.98 (4H, m), 7.05 (1H, d,

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J=1.0Hz), 7.22-7.58 (5H, m), 7.58-7.90 (7H, m),
8.16 (1H, d, J=9.0Hz), 8.34 (1H, d, J=8.4Hz),
8.57 (1H, d, J=7.7Hz), 8.85 (1H, s)

FAB-MASS : $m/z = 1258 (M^+ + Na)$

5 Elemental Analysis Calcd. for $C_{55}H_{71}N_8O_{21}SNa \cdot 5H_2O$:

C 49.84, H 6.15, N 8.45

Found : C 49.77, H 6.27, N 8.39

Example 20

10 IR (Nujol) : 3353, 1670, 1629, 1540, 1508 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.88 (3H, t, J=6.5Hz), 0.97 (3H,
d, J=6.8Hz), 1.04 (3H, d, J=5.9Hz), 1.20-1.58
(8H, m), 1.60-1.96 (5H, m), 2.08-2.60 (6H, m),
2.70-3.00 (2H, m), 3.00-3.40 (1H, m), 3.60-3.85
15 (2H, m), 3.85-4.50 (13H, m), 4.50-5.60 (12H, m),
6.65-6.90 (3H, m), 7.00-7.15 (3H, m), 7.18-7.50
(4H, m), 7.59 (1H, s), 7.62-7.78 (2H, m), 7.95-
8.20 (2H, m), 8.30 (1H, d, J=7.7Hz), 8.83 (1H,
s)

20 FAB-MASS : $m/z = 1277 (M^+ + Na)$

Elemental Analysis Calcd. for $C_{55}H_{75}N_8O_{22}SNa \cdot 4H_2O$:

C 49.77, H 6.30, N 8.44

Found : C 49.67, H 6.31, N 8.40

25 Example 21

IR (Nujol) : 3351, 1654, 1623, 1538, 1515 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.87 (3H, t, J=6.7Hz), 0.97 (3H,
d, J=6.7Hz), 1.08 (3H, d, J=5.9Hz), 1.20-1.58
(8H, m), 1.66-1.95 (5H, m), 2.10-2.60 (4H, m),
30 3.09-3.30 (1H, m), 3.58-4.60 (15H, m), 4.69-5.20
(10H, m), 5.24 (1H, d, J=4.5Hz), 5.51 (1H, d,
J=6.0Hz), 6.68-6.95 (4H, m), 7.04 (1H, d,
J=1.0Hz), 7.10-7.73 (7H, m), 7.73-7.90 (2H, m),
7.98 (1H, d, J=1.9Hz), 8.10 (1H, d, J=8.4Hz),
35 8.32 (1H, d, J=8.4Hz), 8.50 (1H, d, J=7.7Hz),

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8.84 (1H, s)

FAB-MASS : $m/z = 1275 (M^+ + Na)$ Elemental Analysis Calcd. for $C_{55}H_{73}N_8O_{22}SNa \cdot 5H_2O$:

C 50.38, H 6.38, N 8.55

5

Found : C 49.98, H 6.37, N 8.41

Example 22IR (KBr) : 3340, 2931, 1664, 1627, 1531, 1444, 1278,
1047 cm^{-1}

10 NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.6Hz$), 0.96 (3H,
d, $J=6.8Hz$), 1.08 (3H, d, $J=5.9Hz$), 1.2-1.4 (6H,
m), 1.5-1.7 (2H, m), 1.7-2.1 (3H, m), 2.2-2.4
(3H, m), 2.6-2.7 (3H, m), 3.1-3.2 (1H, m), 3.7-
4.6 (13H, m), 4.78 (1H, d, $J=6.0Hz$), 4.8-5.1
15 (1H, m), 5.09 (1H, d, $J=5.6Hz$), 5.16 (1H, d,
 $J=3.2Hz$), 5.24 (1H, d, $J=4.4Hz$), 5.52 (1H, d,
 $J=6.0Hz$), 6.73 (1H, d, $J=8.2Hz$), 6.83 (2H, d,
 $J=8.3Hz$), 7.05 (1H, s), 7.3-7.5 (5H, m), 7.65
(2H, d, $J=8.2Hz$), 7.74 (2H, d, $J=8.4Hz$), 7.98
20 (2H, d, $J=8.4Hz$), 8.11 (1H, d, $J=8.4Hz$), 8.31
(1H, d, $J=8.4Hz$), 8.79 (1H, d, $J=7.7Hz$), 8.84
(1H, s)

FAB-MASS : $m/z = 1245 (M^+ + Na)$ Elemental Analysis Calcd. for $C_{54}H_{71}N_8O_{21}SNa \cdot 4H_2O$:

25

C 50.07, H 6.15, N 8.65

Found : C 50.26, H 6.44, N 8.67

Example 23

30 NMR (DMSO- d_6 , δ) : 0.91 (3H, t, $J=6.7Hz$), 0.96 (3H,
d, $J=6.8Hz$), 1.05 (3H, d, $J=5.6Hz$), 1.2-1.5 (6H,
m), 1.6-2.1 (5H, m), 2.1-2.7 (4H, m), 3.0-3.5
(9H, m), 3.6-4.5 (15H, m), 4.6-5.6 (11H, m),
6.73 (1H, d, $J=8.2Hz$), 6.8-6.9 (4H, m), 6.95
(2H, d, $J=8.6Hz$), 7.02 (2H, d, $J=9.2Hz$), 7.04
35 (1H, s), 7.2-7.5 (3H, m), 7.82 (2H, d, $J=8.6Hz$),

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8.06 (1H, d, J=8Hz), 8.25 (1H, d, J=6.7Hz), 8.43
(1H, d, J=6.7Hz), 8.85 (1H, s)

IR (KBr) : 3350, 1668, 1629, 1510 cm^{-1}

FAB-MASS : m/z = 1345 (M+Na)

5 Elemental Analysis Calcd. for $\text{C}_{58}\text{H}_{79}\text{N}_{10}\text{O}_{22}\text{SNa}\cdot 6\text{H}_2\text{O}$:
C 48.67, H 6.41, N 9.78
Found : C 48.80, H 6.46, N 9.82

Example 24

10 Major product

IR (KBr) : 3350, 1668, 1631, 1047 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.96 (3H, d, J=6.7Hz), 1.08 (3H,
d, J=5.7Hz), 1.2-1.6 (10H, m), 1.6-2.4 (8H, m),
2.5-2.7 (1H, m), 3.18 (1H, m), 3.21 (3H, s),
15 3.29 (2H, t, J=6.4Hz), 3.6-3.83 (2H, m), 3.83-
4.6 (13H, m), 4.7-5.4 (11H, m), 5.51 (1H, d,
J=5.9Hz), 6.73 (1H, d, J=8.2Hz), 6.83 (1H, d,
J=8.2Hz), 6.85 (1H, s), 7.04 (2H, d, J=8.4Hz),
7.06 (1H, s), 7.31 (1H, s), 7.2-7.5 (2H, m),
20 7.67 (2H, d, J=8.4Hz), 7.71 (2H, d, J=8.4Hz),
7.96 (2H, d, J=8.4Hz), 8.06 (1H, d, J=8Hz), 8.25
(1H, d, J=6.7Hz), 8.74 (1H, d, J=6.7Hz), 8.84
(1H, s)

FAB-MASS : m/z = 1319 (M+Na)

25 Elemental Analysis Calcd. for $\text{C}_{57}\text{H}_{77}\text{N}_8\text{O}_{23}\text{SNa}\cdot 4\text{H}_2\text{O}$:
C 49.99, H 6.26, N 8.18
Found : C 49.74, H 6.27, N 8.06

Minor product

30 IR (KBr) : 3350, 1668, 1631 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.96 (3H, d, J=6.7Hz), 1.08 (3H,
d, J=5.7Hz), 1.2-1.6 (6H, m), 1.6-2.1 (7H, m),
2.1-2.5 (3H, m), 2.5-2.7 (1H, m), 3.18 (1H, m),
3.6-3.8 (2H, m), 3.8-4.6 (13H, m), 4.6-5.2 (12H,
35 m), 5.26 (1H, d, J=4.6Hz), 5.53 (1H, d,

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J=5.8Hz), 5.6-6.0 (1H, m), 6.73 (1H, d, J=8.2Hz), 6.83 (1H, d, J=8.3Hz), 6.85 (1H, s), 7.04 (2H, d, J=8.5Hz), 7.06 (1H, s), 7.30 (1H, s), 7.2-7.5 (2H, m), 7.68 (2H, d, J=8.5Hz), 7.72 (2H, d, J=8.5Hz), 7.96 (2H, d, J=8.5Hz), 8.06 (1H, d, J=8Hz), 8.25 (1H, d, J=6.7Hz), 8.74 (1H, d, J=6.7Hz), 8.85 (1H, s)

FAB-MASS : $m/z = 1287$ (M+Na)Elemental Analysis Calcd. for $C_{56}H_{73}N_8NaO_{22}S \cdot 7H_2O$:

C 48.34, H 6.30, N 8.05

Found : C 48.19, H 6.19, N 7.99

Example 25

IR (KBr) : 3350, 2935, 2873, 1668, 1629, 1538, 1506, 1438, 1257, 1049 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.9-1.0 (6H, m), 1.08 (3H, d, J=5.7Hz), 1.2-1.6 (4H, m), 1.6-2.0 (5H, m), 2.1-2.4 (3H, m), 2.5-2.6 (1H, m), 3.1-3.2 (1H, m), 3.6-4.6 (15H, m), 4.7-5.2 (10H, m), 5.26 (1H, d, J=4.5Hz), 5.55 (1H, d, J=5.9Hz), 6.7-6.9 (3H, m), 7.0-7.6 (7H, m), 7.85 (2H, d, J=8.6Hz), 7.9-8.2 (4H, m), 8.26 (1H, d, J=7.7Hz), 8.8-9.0 (2H, m)

FAB-MASS : $m/z = 1314.3$ (M+Na)⁺Elemental Analysis Calcd. for $C_{56}H_{70}N_9O_{23}NaS \cdot 7H_2O$:

C 47.42, H 5.97, N 8.89

Found : C 47.33, H 5.85, N 8.73

Example 26

To a solution of The Starting Compound (1 g) and succinimido 4-(4-octyloxyphenyl)piperazine-1-carboxylate (0.45 g) in N,N-dimethylformamide (10 ml) was added 4-dimethylaminopyridine (0.141 g), and stirred for 5 days at 50°C. The reaction mixture was pulverized with ethyl acetate. The precipitate was collected by filtration, and

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dried under reduced pressure. The powder was dissolved in water, and subjected to column chromatography on ion exchange resin (DOWEX-50WX4) eluting with water. The fractions containing the object compound were combined, and subjected to column chromatography on ODS (YMC-gel-ODS-AM-S-50) eluting with 50% acetonitrile aqueous solution. The fractions containing the object compound were combined, and evaporated under reduced pressure to remove acetonitrile. The residue was lyophilized to give crude The Object Compound (23). The powder of crude The Object Compound (23) was purified by preparative HPLC utilizing a C₁₈ μ Bondapak resin (Waters Associates, Inc.) which was eluted with a solvent system comprised of (acetonitrile-pH 3 phosphate buffer = 40:60) at a flow rate of 80 ml/minute using a Shimadzu LC-8A pump. The column was monitored by a UV detector set at 240 nm. The fractions containing the object compound were combined, and evaporated under reduced pressure to remove acetonitrile. The residue was subjected to column chromatography on ion exchange resin (DOWEX-50WX4) eluting with water. The fractions containing the object compound were combined, and subjected to column chromatography on ODS (YMC-gel-ODS-AM-S-50) eluting with 50% acetonitrile aqueous solution. The fractions containing the object compound were combined, and evaporated under reduced pressure to remove acetonitrile. The residue was lyophilized to give The Object Compound (23) (60 mg).

IR (KBr) : 3347, 1629, 1511, 1245 cm⁻¹

NMR (DMSO-d₆, δ) : 0.86 (3H, t, J=6.7Hz), 0.95 (3H, d, J=6.8Hz), 1.06 (3H, d, J=5.9Hz), 1.2-1.5 (10H, m), 1.55-1.92 (5H, m), 2.0-2.65 (4H, m), 2.8-3.05 (5H, m), 3.2-4.47 (17H, m), 4.6-5.6 (12H, m), 6.6-7.0 (7H, m), 7.03 (1H, s), 7.2-7.5 (3H, m), 7.9-8.3 (3H, m), 8.84 (1H, s)

FAB-MASS : m/z = 1297 (M⁺+Na)

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Elemental Analysis Calcd. for $C_{54}H_{79}N_{10}O_{22}SNa \cdot 6H_2O \cdot CH_3CN$:

C 47.22, H 6.65, N 10.82

Found : C 47.58, H 7.05, N 10.85

5 Example 27

To a suspension of 1-hydroxybenzotriazole (0.53 g) and 2-(4-octyloxyphenoxy)acetic acid (1 g) in dichlormethane (30 ml) was added 1-ethyl-3-(3'-dimethylaminopropyl)carbodiimide hydrochloride (WSCD·HCl) (0.886 g), and stirred for 3 hours at ambient temperature. The reaction mixture was added to water. The organic layer was taken, and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure to give 1-[2-(4-octyloxyphenoxy)acetyl]benzotriazole 3-oxide (892 mg). To a solution of The Starting Compound (1.79 g) and 1-[2-(4-octyloxyphenoxy)acetyl]benzotriazole 3-oxide (892 mg) in N,N-dimethylformamide (18 ml) was added 4-(N,N-dimethylamino)pyridine (0.297 g), and stirred for 12 hours at ambient temperature. The reaction mixture was pulverized with ethyl acetate. The precipitate was collected by filtration, and dried under reduced pressure. The powder was added to water, and subjected to ion-exchange column chromatography on DOWEX-50WX4, and eluted with water. The fractions containing the object compound were combined, and subjected to column chromatograph on ODS (YMC-gel-ODS-AM-S-50), and eluted with 50% methanol aqueous solution. The fractions containing the object compound were combined, and evaporated under reduced pressure to remove methanol. The residue was lyophilized to give The Object Compound (24) (1.75 g).

IR (KBr) : 3350, 1666, 1629, 1228 cm^{-1} NMR (DMSO- d_6 , δ) : 0.86 (3H, t, J=6.9Hz), 0.95 (3H, d, J=6.7Hz), 1.04 (3H, d, J=5.7Hz), 1.15-1.5 (10H, m), 1.55-2.0 (5H, m), 2.05-2.5 (4H, m),

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3.16 (1H, m), 3.72 (2H, m), 3.88 (3H, t,
J=6.3Hz), 4.41 (2H, s), 3.93-4.6 (11H, m),
4.69-5.25 (10H, m), 5.28 (1H, d, J=4.3Hz), 5.57
(1H, d, J=5.7Hz), 6.73 (1H, d, J=8.2Hz), 6.8-7.0
(5H, m), 7.04 (1H, s), 7.09 (1H, s), 7.3-7.4
(2H, m), 7.92-8.17 (2H, m), 8.29 (1H, d,
J=7.5Hz), 8.84 (1H, s)

FAB-MASS : $m/z = 1243$ ($M^+ + Na$)Elemental Analysis Calcd. for $C_{51}H_{73}N_8O_{23}SNa \cdot 4H_2O$:

C 47.36, H 6.31, N 8.66

Found : C 47.22, H 6.44, N 8.37

The Object Compounds (28) to (31) were obtained
according to a similar manner to that of Example 27.

Example 28

IR (KBr) : 3350, 2933, 1664, 1628, 1446, 1205,
1045 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.8-1.1 (9H, m), 1.2-2.0 (19H, m),
2.1-2.3 (3H, m), 3.6-3.8 (4H, m), 3.9-4.4 (13H, m),
4.6-5.0 (8H, m), 5.07 (1H, d, J=5.6Hz), 5.14 (1H,
d, J=3.2Hz), 5.23 (1H, d, J=4.3Hz), 5.46 (1H, d,
J=6.7Hz), 6.7-6.9 (3H, m), 7.04 (1H, s), 7.2-7.5
(6H, m), 7.8-8.0 (3H, m), 8.05 (1H, d, J=8.4Hz),
8.2-8.4 (2H, m), 8.83 (1H, s)

FAB-MASS : $m/z = 1360$ ($M^+ + Na$)Elemental Analysis Calcd. for $C_{59}H_{80}N_9O_{23}SNa \cdot 6H_2O$:

C 48.99, H 6.41, N 8.72

Found : C 48.92, H 6.37, N 8.64

Example 29

IR (KBr) : 3350, 2927, 1668, 1627, 1535, 1515, 1452,
1440, 1286, 1045 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.83 (3H, t, J=6.7Hz), 0.95 (3H,
d, J=6.7Hz), 1.07 (3H, d, J=5.9Hz), 1.2-1.4

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(12H, m), 1.6-2.0 (5H, m), 2.1-2.4 (3H, m), 2.6 (1H, m), 2.82 (2H, t, $J=7.4\text{Hz}$), 3.1-3.2 (1H, m), 3.6-4.5 (13H, m), 4.7-5.2 (11H, m), 5.4-5.6 (1H, m), 6.72 (1H, d, $J=8.2\text{Hz}$), 6.82 (2H, d, $J=8.1\text{Hz}$), 7.03 (1H, s), 7.2-7.4 (3H, m), 7.47 (1H, d, $J=8.5\text{Hz}$), 7.69 (1H, d, $J=8.5\text{Hz}$), 8.1-8.2 (2H, m), 8.23 (1H, d, $J=8.4\text{Hz}$), 8.62 (1H, d, $J=7.8\text{Hz}$), 8.83 (1H, s)

FAB-MASS : $m/z = 1251 (M^+ + Na)$

10 Elemental Analysis Calcd. for $C_{52}H_{73}N_{10}O_{21}SNa \cdot 5H_2O$:
C 47.34, H 6.34, N 10.61
Found : C 47.30, H 6.45, N 10.45

Example 30

15 NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.8\text{Hz}$), 0.96 (3H, t, $J=6.7\text{Hz}$), 1.05 (3H, t, $J=5.8\text{Hz}$), 1.2-1.5 (10H, m), 1.6-2.0 (5H, m), 2.2-2.4 (3H, m), 2.5-2.6 (1H, m), 3.1-3.2 (1H, m), 3.7-4.5 (15H, m), 4.7-5.0 (8H, m), 5.10 (1H, d, $J=5.6\text{Hz}$), 5.17 (1H, d, $J=3.1\text{Hz}$), 5.26 (1H, d, $J=4.5\text{Hz}$), 5.52 (1H, d, $J=5.8\text{Hz}$), 6.73 (1H, d, $J=8.2\text{Hz}$), 6.8-7.0 (3H, m), 7.04 (1H, s), 7.2-7.4 (3H, m), 8.0-8.3 (3H, m), 8.68 (1H, d, $J=2.3\text{Hz}$), 8.7-8.8 (1H, m), 8.85 (1H, m)

25 FAB-MASS : $m/z = 1214 (M^+ + Na)$
Elemental Analysis Calcd. for $C_{49}H_{70}N_9O_{22}SNa \cdot 4H_2O$:
C 46.55, H 6.22, N 9.97
Found : C 46.29, H 6.18, N 9.71

30 Example 31

IR (Nujol) : 3342, 2210, 1668, 1623 cm^{-1}
NMR (DMSO- d_6 , δ) : 0.88 (3H, t, $J=6.7\text{Hz}$), 0.97 (3H, d, $J=6.7\text{Hz}$), 1.08 (3H, d, $J=6.7\text{Hz}$), 1.20-1.60 (8H, m), 1.60-2.00 (5H, m), 2.05-2.50 (4H, m), 3.05-3.30 (1H, m), 3.60-4.60 (15H, m), 4.65-5.18

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(10H, m), 5.24 (1H, d, $J=4.5\text{Hz}$), 5.58 (1H, d, $J=6.0\text{Hz}$), 6.68-7.10 (4H, m), 7.15-7.65 (5H, m), 7.80-8.30 (6H, m), 8.84 (1H, s), 9.18 (1H, d, $J=7.7\text{Hz}$)

5 FAB-MASS : $m/z = 1273.5$ ($M^+ + Na$)

Example 32

To a solution of 6-heptyloxy-2-naphthoic acid (0.358 g) and triethylamine (0.174 ml) in *N,N*-dimethylformamide (10 ml) was added diphenylphosphoryl azide (0.4 ml), and stirred for an hour at ambient temperature. Then, the reaction mixture was stirred for an hour at 100°C. After cooling, to the reaction mixture was added The Starting Compound (1 g) and 4-(*N,N*-dimethylamino)pyridine (0.140 g), and stirred for 10 hours at ambient temperature. The reaction mixture was pulverized with ethyl acetate. The precipitate was collected by filtration, and dried under reduced pressure. The powder was dissolved in water, and subjected to column chromatography on ion exchange resin (DOWEX-50WX4) eluting with water. The fractions containing the object compound were combined, and subjected to column chromatography on ODS (YMC-gel-ODS-AM-S-50) eluting with 50% acetonitrile aqueous solution. The fractions containing the object compound were combined, and evaporated under reduced pressure to remove acetonitrile. The residue was lyophilized to give The Object Compound (29) (0.832 g).

IR (KBr) : 3350, 1664, 1629, 1546, 1240 cm^{-1}

30 NMR (DMSO- d_6 , δ) : 0.88 (3H, t, $J=6.6\text{Hz}$), 0.97 (3H, d, $J=6.7\text{Hz}$), 1.08 (3H, d, $J=5.9\text{Hz}$), 1.2-1.55 (8H, m), 1.55-2.0 (5H, m), 2.1-2.5 (4H, m), 3.18 (1H, m), 3.6-3.8 (3H, m), 3.9-4.5 (13H, m), 4.7-4.95 (3H, m), 5.0-5.3 (7H, m), 5.59 (1H, d, $J=5.8\text{Hz}$), 6.52 (1H, d, $J=8.1\text{Hz}$), 6.73 (1H, d, $J=8.2\text{Hz}$), 6.83 (1H, d, $J=8.2\text{Hz}$), 6.90 (1H, s),

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7.0-7.15 (3H, m), 7.20 (1H, s), 7.27-7.4 (3H, m), 7.6-7.7 (2H, m), 7.87 (1H, s), 7.95-8.2 (2H, m), 8.69 (1H, s), 8.85 (1H, s)

FAB-MS : $m/z = 1264 (M^+ + Na)$

5 Elemental Analysis Calcd. for $C_{53}H_{72}N_9O_{22}SNa \cdot 5H_2O$:
C 47.78, H 6.20, N 9.46
Found : C 47.65, H 6.42, N 9.34

10 The Object Compound (33) was obtained according to a similar manner to that of Example 32.

Example 33

IR (KBr) : 3350, 1666, 1629, 1537, 1240 cm^{-1}

15 NMR (DMSO- d_6 , δ) : 0.87 (3H, t, $J=6.7Hz$), 0.97 (3H, d, $J=6.7Hz$), 1.09 (3H, d, $J=5.8Hz$), 1.2-1.55 (8H, m), 1.55-2.0 (5H, m), 2.07-2.6 (4H, m), 3.18 (1H, m), 3.6-3.85 (3H, m), 3.9-4.5 (13H, m), 4.7-4.98 (3H, m), 5.0-5.3 (7H, m), 5.57 (1H, d, $J=5.9Hz$), 6.50 (1H, d, $J=8.1Hz$), 6.73 (1H, d, $J=8.2Hz$), 6.82 (1H, dd, $J=8.2$ and $1.7Hz$), 6.87 (1H, s), 6.97 (2H, d, $J=8.8Hz$), 7.05 (1H, d, $J=1.7Hz$), 7.10 (1H, s), 7.23-7.43 (2H, m), 7.38 (2H, d, $J=8.8Hz$), 7.50 (2H, d, $J=8.8Hz$), 7.52 (2H, d, $J=8.8Hz$), 8.0-8.15 (2H, m), 8.65 (1H, s), 8.84 (1H, s)

25 FAB-MASS : $m/z = 1290 (M^+ + Na)$

Elemental Analysis Calcd. for $C_{55}H_{74}N_9O_{22}SNa \cdot 7H_2O$:
C 47.38, H 6.36, N 9.04
Found : C 47.67, H 6.53, N 9.03

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Example 34

A solution of The Starting Compound (2.45 g), 3-[4-(4-pentylphenyl)phenyl]propionic acid (0.90 g), 1-ethyl-3-(3'-dimethylaminopropyl)carbodiimide hydrochloride (WSCD-HCl) (0.59 g) and triethylamine (0.43 ml) in N,N-

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dimethylformamide (50 ml) was stirred for 15 hours at ambient temperature. The reaction mixture was diluted with ethyl acetate, and the resultant precipitate was collected by filtration, and washed in turn with ethyl acetate and diisopropyl ether, and dried under reduced pressure. The powder was dissolved in water, and was subjected to column chromatography on ion exchange resin (DOWEX-50WX4 (Na form, 50 ml)) eluting with water. The fractions containing the object compound were combined, and subjected to reversed phase chromatography on ODS (YMC-gel-ODS-AM-S-50, 50 ml) eluting with (water : acetonitrile = 10:0 - 7:3, V/V). The fractions containing the object compound were combined, and evaporated under reduced pressure to remove acetonitrile. The residue was lyophilized to give The Object Compound (31) (1.53 g).

IR (Nujol) : 3351, 2212, 1668, 1627 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.87 (3H, t, $J=6.5\text{Hz}$), 0.96 (3H, d, $J=6.7\text{Hz}$), 1.08 (3H, d, $J=5.8\text{Hz}$), 1.20-1.50 (4H, m), 1.50-2.00 (5H, m), 2.03-2.55 (4H, m), 2.62 (2H, t, $J=7.5\text{Hz}$), 3.17 (1H, t, $J=8.4\text{Hz}$), 3.55-4.57 (15H, m), 4.65-5.13 (9H, m), 5.16 (1H, d, $J=3.2\text{Hz}$), 5.24 (1H, d, $J=4.5\text{Hz}$), 5.58 (1H, d, $J=5.8\text{Hz}$), 6.67-6.90 (3H, m), 6.93-7.10 (2H, m), 7.15-7.50 (4H, m), 7.50-7.90 (6H, m), 8.06 (1H, d, $J=8.4\text{Hz}$), 8.15 (1H, d, $J=7.7\text{Hz}$), 8.84 (1H, s), 9.19 (1H, d, $J=7.1\text{Hz}$)

FAB-MASS : m/z = 1255 (M^+ +Na)

Elemental Analysis Calcd. for $\text{C}_{55}\text{H}_{69}\text{N}_8\text{O}_{21}\text{SNa}\cdot 4\text{H}_2\text{O}$:

C 50.61, H 5.95, N 8.58

Found : C 50.47, H 6.00, N 8.54

Example 35

To a suspension of 1-hydroxybenzotriazole (501 mg) and 4-(4-heptylphenyl)benzoic acid (1 g) in dichloromethane (30 ml) was added 1-ethyl-3-(3'-

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dimethylaminopropyl)carbodiimide hydrochloride (WSCD·HCl) (839 mg), and stirred for 3 hours at ambient temperature. The reaction mixture was added to water. The organic layer was separated, and dried over magnesium sulfate. The magnesium sulfate was filtered off, and the filtrate was evaporated under reduced pressure to give 1-[4-(4-heptylphenyl)benzoyl]benzotriazole 3-oxide. To a solution of The Starting Compound (2.49 g) and 1-[4-(4-heptylphenyl)benzoyl]benzotriazole 3-oxide in N,N-dimethylformamide (25 ml) was added 4-(N,N-dimethylamino)pyridine (381 mg), and stirred for 12 hours at ambient temperature. The reaction mixture was pulverized with ethyl acetate. The precipitate was collected by filtration, and dried under reduced pressure. The residue was dissolved in water, and subjected to column chromatography on ion exchange resin (DOWEX-50WX4) eluting with water. The fraction containing the object compound were combined, and subjected to column chromatography on ODS (YMC-gel-ODS-AM-S-50) eluting with 30% acetonitrile aqueous solution. The fractions containing the object compound were combined, and evaporated under reduced pressure to remove acetonitrile. The residue was lyophilized to give The Object Compound (32) (1.99 g).

IR (Nujol) : 3350, 2852, 1749, 1621, 1457, 1376, 1045 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.7\text{Hz}$), 0.96 (3H, d, $J=6.7\text{Hz}$), 1.08 (3H, d, $J=5.9\text{Hz}$), 1.5-1.7 (2H, m), 1.7-2.2 (3H, m), 2.2-2.5 (3H, m), 2.6-2.8 (3H, m), 3.1-3.2 (1H, m), 3.7-4.6 (13H, m), 4.7-5.2 (8H, m), 5.12 (1H, d, $J=5.5\text{Hz}$), 5.18 (1H, d, $J=2.9\text{Hz}$), 5.27 (1H, d, $J=4.4\text{Hz}$), 5.54 (1H, d, $J=5.8\text{Hz}$), 6.7-6.9 (3H, m), 7.05 (1H, s), 7.2-7.4 (5H, m), 7.65 (2H, d, $J=8.0\text{Hz}$), 7.74 (2H, d, $J=8.3\text{Hz}$), 7.98 (2H, d, $J=8.3\text{Hz}$), 8.11

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(1H, d, J=8.7Hz), 8.28 (1H, d, J=8.4Hz), 8.78
(1H, d, J=7.3Hz), 8.85 (1H, s)

FAB-MASS : m/z = 1259 (M⁺+Na)

Elemental Analysis Calcd. for C₅₅H₇₃N₈O₂₁SNa·5H₂O :

C 49.77, H 6.30, N 8.44

Found : C 49.98, H 6.44, N 8.41

The Object Compounds (36) to (107) were obtained
according to a similar manner to that of Example 1.

Example 36

IR (KBr) : 3350, 1675.8, 1629.6, 1515.8 cm⁻¹

NMR (DMSO-d₆, δ) : 0.86 (6H, d, J=6.6Hz), 0.96 (3H, d,
J=6.6Hz), 1.06 (3H, d, J=5.7Hz), 1.1-1.3 (2H, m),
1.4-2.0 (6H, m), 2.0-2.7 (4H, m), 3.1-3.5 (9H, m),
3.66 (2H, t, J=7.3Hz), 3.6-4.5 (13H, m), 4.7-5.6
(12H, m), 6.73 (1H, d, J=8.3Hz), 6.82 (1H, d,
J=8.3Hz), 6.8-6.9 (1H, m), 7.02 (2H, d, J=9.0Hz),
7.04 (1H, s), 7.11 (2H, d, J=9.0Hz), 7.2-7.6 (3H,
m), 7.50 (2H, d, J=9.0Hz), 7.82 (2H, d, J=9.0Hz),
8.1 (1H, d, J=8.5Hz), 8.28 (1H, d, J=8.5Hz), 8.33
(1H, s), 8.45 (1H, d, J=7.0Hz), 8.84 (1H, s)

FAB-MASS : m/z = 1412 (M+Na)

Elemental Analysis Calcd. for C₆₀H₈₀N₁₃O₂₂SNa·9H₂O :

C 46.42, H 6.36, N 11.73

Found : C 46.64, H 6.43, N 11.62

Example 37

IR (KBr) : 3350, 1668.1, 1629.6, 1268.9 cm⁻¹

NMR (DMSO-d₆, δ) : 0.85 (3H, t, J=6.6Hz), 0.96 (3H, d,
J=6.7Hz), 1.07 (3H, d, J=5.9Hz), 1.2-1.4 (10H, m),
1.4-2.0 (5H, m), 2.0-2.5 (4H, m), 2.61 (2H, t,
J=7.2Hz), 3.1-3.3 (1H, m), 3.6-4.5 (13H, m), 4.40
(2H, s), 4.6-5.3 (11H, m), 5.60 (1H, d, J=5.8Hz),
6.73 (1H, d, J=8.2Hz), 6.82 (1H, d, J=8.2Hz), 6.6-

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6.9 (1H, m), 7.04 (1H, s), 7.0-7.1 (1H, m), 7.32
(2H, d, J=8.5Hz), 7.2-7.5 (2H, m), 7.58 (2H, d,
J=8.5Hz), 7.93 (1H, d, J=7Hz), 8.04 (1H, d,
J=9.4Hz), 8.41 (1H, s), 8.44 (1H, d, J=9.4Hz), 8.84
(1H, s)

FAB-MASS : $m/z = 1294$ (M+Na)

Elemental Analysis Calcd. for $C_{53}H_{74}N_{11}O_{22}SNa \cdot 7H_2O$:

C 45.52, H 6.34, N 11.02

Found : C 45.47, H 6.27, N 10.93

Example 38

Major product

IR (KBr) : 3349.7, 1670.1, 1627.6, 1508.1 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.96 (3H, d, J=6.6Hz), 1.06 (3H, d,
J=5.7Hz), 1.2-1.6 (8H, m), 1.6-2.1 (5H, m), 2.1-2.7
(4H, m), 3.0-3.2 (5H, m), 3.21 (3H, s), 3.30 (2H,
t, J=6.5Hz), 3.3-3.5 (4H, m), 3.6-4.5 (15H, m),
4.7-5.3 (11H, m), 5.49 (1H, d, J=5.9Hz), 6.73 (1H,
d, J=8.3Hz), 6.8-6.9 (4H, m), 6.95 (2H, d,
J=9.2Hz), 7.01 (2H, d, J=8.5Hz), 7.04 (1H, s), 7.20
(1H, s), 7.2-7.5 (2H, m), 7.81 (2H, d, J=8.5Hz),
8.09 (1H, d, J=8.7Hz), 8.28 (1H, d, J=8.7Hz), 8.45
(1H, d, J=6.7Hz), 8.84 (1H, s)

FAB-MASS : $m/z = 1389$ (M+Na)

Elemental Analysis Calcd. for $C_{60}H_{83}N_{10}O_{23}SNa \cdot 8H_2O$:

C 47.68, H 6.60, N 9.27

Found : C 47.83, H 6.72, N 9.27

Minor product

IR (KBr) : 3338.2, 1646.9, 1511.9 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.96 (3H, d, J=6.7Hz), 1.06 (3H, d,
J=5.7Hz), 1.3-1.6 (4H, m), 1.6-2.7 (11H, m), 3.0-
3.2 (5H, m), 3.3-3.5 (4H, m), 3.6-4.5 (15H, m),
4.7-5.3 (13H, m), 5.48 (1H, d, J=5.9Hz), 5.7-6.0
(1H, m), 6.73 (1H, d, J=8.2Hz), 6.8-6.9 (4H, m),

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6.94 (2H, d, J=9.3Hz), 7.01 (2H, d, J=8.6Hz), 7.04 (1H, s), 7.2-7.5 (3H, m), 7.81 (2H, d, J=8.6Hz), 8.06 (1H, d, J=8.7Hz), 8.25 (1H, d, J=8.7Hz), 8.42 (1H, d, J=6.7Hz), 8.84 (1H, s)

5 FAB-MASS : m/z = 1357 (M+Na)

Elemental Analysis Calcd. for $C_{59}H_{79}N_{10}O_{22}SNa \cdot 9H_2O$:
C 47.32, H 6.53, N 9.35
Found : C 47.08, H 6.66, N 9.25

10 Example 39

IR (KBr) : 3350, 1670.1, 1631.5, 1510.0, 1234.2 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.87 (3H, t, J=6.7Hz), 0.96 (3H, d, J=6.7Hz), 1.06 (3H, d, J=5.6Hz), 1.2-1.5 (8H, m), 1.6-2.1 (5H, m), 2.1-2.7 (4H, m), 3.0-3.3 (5H, m), 3.3-3.5 (4H, m), 3.6-3.8 (2H, m), 3.88 (2H, d, J=6.4Hz), 3.8-4.5 (11H, m), 4.7-5.1 (8H, m), 5.10 (1H, d, J=5.6Hz), 5.16 (1H, d, J=3.1Hz), 5.25 (1H, d, J=4.5Hz), 5.48 (1H, d, J=5.9Hz), 6.73 (1H, d, J=8.2Hz), 6.8-6.9 (4H, m), 6.94 (2H, d, J=9.3Hz), 7.01 (2H, d, J=8.7Hz), 7.04 (1H, s), 7.2-7.5 (3H, m), 7.81 (2H, d, J=8.7Hz), 8.06 (1H, d, J=8Hz), 8.25 (1H, d, J=6.7Hz), 8.43 (1H, d, J=6.7Hz), 8.85 (1H, s)

20 FAB-MASS : m/z = 1359 (M+Na)

25 Elemental Analysis Calcd. for $C_{59}H_{81}N_{10}O_{22}SNa \cdot 5H_2O$:
C 49.64, H 6.43, N 9.81
Found : C 49.49, H 6.54, N 9.72

Example 40

30 IR (KBr) : 3355.5, 1670.1, 1627.6, 1510.0 1236.1 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.89 (6H, d, J=6.5Hz), 0.96 (3H, d, J=6.7Hz), 1.05 (3H, d, J=5.7Hz), 1.2-1.4 (2H, m), 1.5-2.1 (6H, m), 2.1-2.7 (4H, m), 3.0-3.6 (9H, m), 3.6-4.5 (15H, m), 4.5-5.4 (12H, m), 6.73 (1H, d, J=8.2Hz), 6.8-6.9 (4H, m), 6.96 (2H, d, J=9.6Hz),

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7.02 (2H, d, J=8.7Hz), 7.05 (1H, s), 7.2-7.5 (3H, m), 7.82 (2H, d, J=8.7Hz), 8.08 (1H, d, J=8Hz), 8.27 (1H, d, J=6.7Hz), 8.46 (1H, d, J=6.7Hz), 8.85 (1H, s)

5 FAB-MASS : m/z = 1345 (M+Na)

Elemental Analysis Calcd. for $C_{58}H_{79}N_{10}O_{22}SNa \cdot 8H_2O$:

C 47.47, H 6.52, N 9.54

Found : C 47.47, H 6.54, N 9.51

10 Example 41

IR (KBr) : 3347.8, 1668.1, 1629.6, 1510.0, 1234.2 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.89 (3H, t, J=7.0Hz), 0.96 (3H, d, J=6.7Hz), 1.05 (3H, d, J=5.8Hz), 1.2-1.5 (4H, m), 1.6-2.1 (5H, m), 2.1-2.7 (4H, m), 3.0-3.6 (9H, m), 3.6-3.8 (2H, m), 3.8-4.5 (13H, m), 4.7-5.6 (12H, m), 6.73 (1H, d, J=8.2Hz), 6.8-6.9 (4H, m), 6.96 (2H, d, J=8.7Hz), 7.02 (2H, d, J=9.0Hz), 7.04 (1H, s), 7.2-7.5 (3H, m), 7.82 (2H, d, J=8.7Hz), 8.07 (1H, d, J=8Hz), 8.27 (1H, d, J=6.7Hz), 8.45 (1H, d, J=6.7Hz), 8.85 (1H, s)

20 FAB-MASS : m/z = 1331 (M+Na)

Elemental Analysis Calcd. for $C_{57}H_{77}N_{10}O_{22}SNa \cdot 6H_2O$:

C 48.30, H 6.33, N 9.88

Found : C 48.20, H 6.58, N10.03

25 Example 42

Mixture product

IR (KBr) : 3344, 1670.1, 1631.5 cm^{-1}

30 NMR (DMSO- d_6 , δ) : 0.96 (3H, d, J=6.7Hz), 1.08 (3H, d, J=5.9Hz), 1.2-1.5 (8H, m), 1.6-2.1 (7H, m), 2.1-2.7 (4H, m), 3.1-3.3 (1H, m), 3.6-4.5 (15H, m), 4.45 and 4.70 (2H, t, J=7.1Hz), 4.6-5.3 (11H, m), 5.52 (1H, d, J=5.9Hz), 6.73 (1H, d, J=8.2Hz), 6.83 (1H, d, J=8.2Hz), 6.85 (1H, s), 7.03 (2H, d, J=8.6Hz), 7.05 (1H, s), 7.2-7.5 (3H, m), 7.68 (2H, d,

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J=8.6Hz), 7.71 (2H, d, J=8.4Hz), 7.96 (2H, d, J=8.4Hz), 8.12 (1H, d, J=8.5Hz), 8.30 (1H, d, J=7.0Hz)

FAB-MASS : m/z = 1357 (M+Na)

5 Elemental Analysis Calcd. for $C_{57}H_{75}N_{12}O_{22}Na \cdot 4H_2O$:
C 48.64, H 5.94, N 11.94
Found : C 48.91, H 5.88, N 11.86

Example 43

10 IR (KBr) : 3350, 1666.2, 1651.5 cm^{-1}
NMR (DMSO- d_6 , δ) : 0.96 (3H, d, J=6.7Hz), 1.05 (6H, d, J=6.3Hz), 1.06 (3H, d, J=5.7Hz), 1.2-1.6 (10H, m),
1.6-2.1 (7H, m), 2.1-2.7 (6H, m), 2.8-3.0 (2H, m),
3.0-3.2 (1H, m), 3.4-3.7 (2H, m), 3.6-3.8 (2H, m),
15 3.8-4.5 (13H, m), 4.7-5.6 (12H, m), 6.73 (1H, d, J=8.2Hz), 6.8-7.0 (2H, m), 7.03 (2H, d, J=8.7Hz),
7.06 (1H, s), 7.2-7.5 (3H, m), 7.67 (2H, d, J=8.7Hz), 7.71 (2H, d, J=8.4Hz), 7.96 (2H, d, J=8.4Hz), 8.04 (1H, d, J=8.5Hz), 8.31 (1H, d, J=8.5Hz), 8.73 (1H, d, J=7.0Hz), 8.90 (1H, s)
20 FAB-MASS : m/z = 1402 (M+Na)

Example 44

25 IR (KBr pelet) : 3350, 2929, 2856, 1670, 1631, 1510, 1243, 1045 cm^{-1}
NMR (DMSO- d_6 , δ) : 0.86 (3H, t, J=6.8Hz), 0.96 (3H, d, J=6.7Hz), 1.06 (3H, d, J=5.7Hz), 1.6-2.0 (5H, m),
2.2-2.5 (5H, m), 2.6-2.7 (1H, m), 3.0-3.3 (5H, m),
3.6-4.5 (19H, m), 4.77 (2H, d, J=5.9Hz), 4.8-5.1
30 (6H, m), 5.10 (1H, d, J=5.6Hz), 5.17 (1H, d, J=3.1Hz), 5.25 (1H, d, J=4.5Hz), 5.50 (1H, d, J=5.8Hz), 6.7-7.0 (8H, m), 7.04 (1H, s), 7.2-7.4 (3H, m), 8.0-8.2 (2H, m), 8.26 (1H, d, J=8.0Hz), 8.55 (1H, d, J=7.3Hz), 8.67 (1H, d, J=1.2Hz), 8.85
35 (1H, s)

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FAB-MASS : $m/z = 1374.3$ ($M+Na^+$)

Elemental Analysis Calcd. for $C_{59}H_{82}N_{11}O_{22}NaS \cdot 5.5H_2O$:
C 48.82, H 6.46, N 10.61
Found : C 48.89, H 6.74, N 10.50

5

Example 45

IR (KBr) : 3350, 2935, 1668, 1623, 1538, 1257, 1174,
1047 cm^{-1}

10 NMR (DMSO- d_6 , δ) : 0.8-1.1 (6H, m), 1.09 (3H, d,
J=5.7Hz), 1.2-1.6 (6H, m), 1.7-2.1 (5H, m), 2.2-2.4
(3H, m), 2.5-2.6 (1H, m), 3.6-3.8 (2H, m), 3.8-4.6
(14H, m), 4.8-5.2 (7H, m), 5.18 (1H, d, J=3.1Hz),
5.26 (1H, d, J=4.5Hz), 5.54 (1H, d, J=5.8Hz), 6.7-
15 7.5 (9H, m), 7.82 (1H, d, J=8.5Hz), 7.96 (1H, d,
J=8.7Hz), 8.1-8.4 (5H, m), 8.8-9.0 (2H, m)

FAB-MASS : $m/z = 1302.6$ ($M+Na^+$)

Elemental Analysis Calcd. for $C_{55}H_{70}N_9O_{23}SNa \cdot 6H_2O$:
C 47.58, H 5.95, N 9.08
Found : C 47.46, H 6.04, N 9.05

20

Example 46

IR (KBr) : 3355, 2958, 1670, 1627, 1521, 1247,
1047 cm^{-1}

25 NMR (DMSO- d_6 , δ) : 0.9-1.0 (6H, m), 1.08 (3H, d,
J=5.6Hz), 1.4-1.6 (2H, m), 1.7-2.1 (5H, m), 2.1-2.4
(3H, m), 2.5-2.6 (1H, m), 3.1-3.3 (1H, m), 3.7-3.8
(2H, m), 3.9-4.6 (13H, m), 4.8-5.1 (8H, m), 5.11
(1H, d, J=5.6Hz), 5.17 (1H, d, J=3.1Hz), 5.26 (1H,
d, J=4.5Hz), 5.54 (1H, d, J=5.9Hz), 6.7-6.9 (3H,
30 m), 7.0-7.2 (3H, m), 7.3-7.5 (3H, m), 7.7-7.9 (8H,
m), 8.02 (2H, d, J=8.4Hz), 8.08 (1H, d, J=8.4Hz),
8.32 (1H, d, J=7.7Hz), 8.81 (1H, d, J=7.0Hz), 8.85
(1H, s)

FAB-MASS : $m/z = 1309.3$ ($M+Na$)⁺

35 Elemental Analysis Calcd. for $C_{58}H_{71}N_8O_{22}NaS \cdot 6H_2O$:

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C 49.92, H 6.00, N 8.03

Found : C 49.92, H 5.97, N 8.03

Example 47

5 IR (KBr) : 3350, 2933, 1668, 1629, 1517, 1249,
1045 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.88 (3H, t, $J=6.7\text{Hz}$), 0.96 (3H, d, $J=6.7\text{Hz}$), 1.08 (3H, d, $J=5.8\text{Hz}$), 1.7-2.7 (8H, m),
3.1-3.3 (1H, m), 3.6-4.5 (16H, m), 4.7-5.2 (8H, m),
10 5.18 (1H, d, $J=3.1\text{Hz}$), 5.27 (1H, d, $J=4.5\text{Hz}$), 5.56
(1H, d, $J=5.8\text{Hz}$), 6.7-7.0 (3H, m), 7.0-7.2 (3H, m),
7.2-7.5 (3H, m), 8.0-8.4 (6H, m), 8.85 (1H, s),
8.96 (1H, d, $J=7.0\text{Hz}$), 9.07 (1H, s)

FAB-MASS : $m/z = 1276.6$ ($M+\text{Na}^+$)

15 Elemental Analysis Calcd. for $\text{C}_{54}\text{H}_{72}\text{N}_9\text{O}_{22}\text{NaS}\cdot 5\text{H}_2\text{O}$:

C 48.25, H 6.15, N 9.38

Found : C 48.10, H 6.14, N 9.30

Example 48IR (KBr) : 3350, 2931, 1668, 1629, 1537, 1049 cm^{-1}

20 NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.9\text{Hz}$), 0.9-1.5
(16H, m), 1.6-2.4 (8H, m), 2.5-2.7 (1H, m), 3.1-3.3
(1H, m), 3.5-5.6 (25H, m), 6.6-7.4 (8H, m), 7.8-8.4
(6H, m), 8.7-9.0 (2H, m), 9.00 (1H, d, $J=2.4\text{Hz}$)

FAB-MASS : $m/z = 1331.4$ ($M+\text{Na}^+$)

25 Elemental Analysis Calcd. for $\text{C}_{56}\text{H}_{73}\text{N}_{10}\text{O}_{23}\text{NaS}\cdot 8\text{H}_2\text{O}$:

C 46.28, H 6.17, N 9.64

Found : C 46.50, H 6.27, N 9.65

Example 49

30 IR (KBr pelet) : 3300, 2931, 1668, 1650, 1629, 1538,
1515, 1268, 1049 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.87 (3H, t, $J=6.6\text{Hz}$), 0.97 (3H, d, $J=6.7\text{Hz}$), 1.10 (3H, d, $J=5.6\text{Hz}$), 1.2-1.4 (6H, m),
1.5-1.7 (2H, m), 1.7-2.1 (3H, m), 2.1-2.4 (3H, m),
35 2.6-2.7 (3H, m), 3.1-3.2 (1H, m), 3.7-3.9 (2H, m),

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3.9-4.5 (12H, m), 4.8-5.1 (7H, m), 5.11 (1H, d, J=5.5Hz), 5.18 (1H, d, J=3.1Hz), 5.27 (1H, d, J=4.5Hz), 5.55 (1H, d, J=5.8Hz), 6.7-7.0 (3H, m), 7.06 (1H, s), 7.3-7.5 (5H, m), 7.72 (2H, d, J=8.2Hz), 7.9-8.2 (5H, m), 8.3-8.4 (4H, m), 8.9-9.0 (2H, m)

FAB-MASS : $m/z = 1260.5$ ($M+Na^+$)

Elemental Analysis Calcd. for $C_{61}H_{74}N_9O_{22}SNa \cdot 6H_2O$:

C 50.58, H 5.98, N 8.70

Found : C 50.34, H 6.16, N 8.55

Example 50

IR (KBr) : 3369, 2958, 2935, 1670, 1629, 1525, 1473, 1247, 1047 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.95 (3H, t, J=7.3Hz), 0.97 (3H, d, J=6.7Hz), 1.09 (3H, d, J=5.7Hz), 1.3-1.6 (2H, m), 1.7-2.1 (5H, m), 2.1-2.4 (3H, m), 2.5-2.6 (1H, m), 3.1-3.3 (1H, m), 3.7-4.6 (15H, m), 4.7-5.1 (8H, m), 5.10 (1H, d, J=5.6Hz), 5.18 (1H, d, J=3.1Hz), 5.26 (1H, d, J=4.4Hz), 5.56 (1H, d, J=5.7Hz), 6.7-7.0 (3H, m), 7.1-7.2 (3H, m), 7.2-7.4 (3H, m), 7.70 (2H, d, J=8.6Hz), 7.78 (2H, d, J=8.4Hz), 8.1-8.4 (6H, m), 8.85 (1H, s), 8.99 (1H, d, J=7.0Hz), 9.13 (1H, d, J=1.6Hz)

FAB-MASS : $m/z = 1310.1$ ($M+Na$)⁺

Elemental Analysis Calcd. for $C_{57}H_{70}N_9O_{22}NaS \cdot 7H_2O$:

C 47.20, H 6.12, N 8.69

Found : C 47.42, H 6.19, N 8.92

Example 51

IR (KBr) : 3351, 2937, 2875, 1670, 1627, 1533, 1245, 1047 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.96 (3H, d, J=6.7Hz), 1.08 (3H, d, J=5.7Hz), 1.5-1.7 (2H, m), 1.7-2.1 (7H, m), 2.1-2.4 (3H, m), 2.5-2.6 (1H, m), 3.1-3.2 (1H, m), 3.7-

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3.8 (2H, m), 3.9-4.6 (15H, m), 4.7-4.9 (3H, m),
5.0-5.1 (5H, m), 5.10 (1H, d, J=5.6Hz), 5.17 (1H,
d, J=3.1Hz), 5.26 (1H, d, J=4.5Hz), 5.52 (1H, d,
J=5.9Hz), 6.7-7.1 (9H, m), 7.2-7.5 (5H, m), 7.68
5 (2H, d, J=8.2Hz), 7.72 (2H, d, J=6.7Hz), 7.96 (2H,
d, J=8.2Hz), 8.06 (1H, d, J=8.4Hz), 8.28 (1H, d,
J=7.7Hz), 8.76 (1H, d, J=7.0Hz), 8.85 (1H, s)

FAB-MASS : $m/z = 1339.5$ ($M+Na^+$)Elemental Analysis Calcd. for $C_{59}H_{73}N_8O_{23}NaS \cdot 7H_2O$:

10 C 49.09, H 6.08, N 7.76
Found : C 49.04, H 6.08, N 7.82

Example 52

15 IR (KBr) : 3350, 2954, 2937, 1670, 1631, 1440, 1257,
1047 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.89 (3H, t, J=6.8Hz), 0.97 (3H, d,
J=6.7Hz), 1.09 (2H, d, J=5.8Hz), 1.2-1.5 (6H, m),
1.7-2.1 (5H, m), 2.1-2.4 (3H, m), 2.5-2.6 (1H, m),
3.1-3.2 (1H, m), 3.7-4.6 (15H, m), 4.7-5.3 (11H,
20 m), 5.5-5.6 (1H, m), 6.7-6.9 (1H, m), 7.0-7.5 (6H,
m), 8.0-8.4 (8H, m), 8.85 (1H, s), 8.96 (1H, d,
J=7.0Hz)

APCI-MASS : $m/z = 1329.0$ ($M+Na$)⁺Elemental Analysis Calcd. for $C_{56}H_{71}N_{10}O_{23}NaS \cdot 6H_2O$:

25 C 47.52, H 5.91, N 9.90
Found : C 47.42, H 6.05, N 9.90

Example 53

30 IR (KBr) : 3350, 2952, 1666, 1629, 1537, 1519,
1255 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.89 (3H, t, J=6.7Hz), 0.96 (3H, d,
J=6.4Hz), 1.08 (3H, d, J=5.6Hz), 1.7-2.4 (8H, m),
2.5-2.6 (1H, m), 3.7-4.5 (15H, m), 4.7-5.1 (8H, m),
5.11 (1H, d, J=5.5Hz), 5.17 (1H, d, J=3.1Hz), 5.26
35 (1H, d, J=3.1Hz), 5.56 (1H, d, J=5.7Hz), 6.73 (1H,

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d, $J=8.2\text{Hz}$), 6.7-7.0 (2H, m), 7.05 (1H, s), 7.13 (2H, d, $J=8.7\text{Hz}$), 7.2-7.5 (3H, m), 7.97 (2H, d, $J=8.7\text{Hz}$), 8.1-8.4 (6H, m), 8.85 (1H, s), 8.92 (1H, d, $J=7.0\text{Hz}$)

5 FAB-MASS : $m/z = 1345.3$ (M+Na)⁺

Elemental Analysis Calcd. for

$\text{C}_{56}\text{H}_{71}\text{N}_{10}\text{O}_{22}\text{S}_2\text{Na}\cdot 8\text{H}_2\text{O}$:

C 45.84, H 5.98, N 9.55

Found : C 45.87, H 6.07, N 9.55

10

Example 54

IR (KBr pelet) : 3350, 2931, 1670, 1652, 1628, 1442, 1247, 1047 cm^{-1}

15 NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.6\text{Hz}$), 0.97 (3H, d, $J=6.8\text{Hz}$), 1.12 (3H, d, $J=6.8\text{Hz}$), 1.2-1.5 (10H, m), 1.7-2.0 (5H, m), 2.2-2.4 (3H, m), 2.5-2.6 (1H, m), 3.1-3.2 (1H, m), 3.72 (2H, br), 3.8-4.5 (17H, m), 4.7-5.2 (9H, m), 5.26 (1H, d, $J=4.6\text{Hz}$), 5.57 (1H, d, $J=5.7\text{Hz}$), 6.7-7.1 (7H, m), 7.3-7.5 (3H, m), 7.66 (2H, d, $J=8.7\text{Hz}$), 8.10 (1H, d, $J=7.6\text{Hz}$), 8.17 (1H, d, $J=7.6\text{Hz}$), 8.76 (1H, d, $J=7.0\text{Hz}$), 8.85 (1H, s)

20

FAB-MASS : $m/z = 1293$ (M+Na)⁺

Elemental Analysis Calcd. for $\text{C}_{54}\text{H}_{75}\text{N}_{10}\text{O}_{22}\text{NaS}\cdot 7\text{H}_2\text{O}$:

C 46.41, H 6.42, N 10.02

25

Found : C 46.51, H 6.43, N 9.95

Example 55

IR (KBr) : 3345, 2937, 1650, 1511, 1249, 1047 cm^{-1}

30 NMR (DMSO- d_6 , δ) : 0.91 (3H, t, $J=7.0\text{Hz}$), 0.96 (3H, t, $J=7.8\text{Hz}$), 1.09 (3H, d, $J=6.8\text{Hz}$), 1.3-1.5 (4H, m), 1.6-2.1 (5H, m), 2.1-2.5 (3H, m), 2.5-2.6 (1H, m), 3.1-3.3 (1H, m), 3.7-3.9 (2H, m), 3.9-4.6 (13H, m), 4.79 (2H, d, $J=5.9\text{Hz}$), 4.8-4.9 (1H, m), 4.9-5.2 (5H, m), 5.10 (1H, d, $J=5.9\text{Hz}$), 5.17 (1H, d, $J=3.1\text{Hz}$), 5.25 (1H, d, $J=4.6\text{Hz}$), 5.53 (1H, d,

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$J=5.9\text{Hz}$), 6.7-7.0 (3H, m), 7.0-7.2 (3H, m), 7.19 (1H, s), 7.3-7.5 (3H, m), 7.7-8.1 (6H, m), 8.08 (1H, d, $J=10.0\text{Hz}$), 8.26 (1H, d, $J=8.8\text{Hz}$), 8.77 (1H, m), 8.85 (1H, s), 13.32 (1H, s)

5 FAB-MASS : $m/z = 1314.0$ (M+Na)⁺

Elemental Analysis Calcd. for $\text{C}_{56}\text{H}_{71}\text{N}_{10}\text{O}_{22}\text{SNa}\cdot 8\text{H}_2\text{O}$:
C 46.86, H 6.11, N 9.76
Found : C 46.93, H 5.87, N 9.74

10 Example 56

IR (KBr) : 3350, 2958, 2935, 2873, 1666, 1629, 1247,
1045 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.9-1.1 (6H, m), 1.08 (3H, d, $J=6.0\text{Hz}$), 1.4-1.6 (2H, m), 1.6-2.1 (5H, m), 2.1-2.4 (3H, m), 2.5-2.6 (1H, m), 3.1-3.3 (1H, m), 3.6-4.5 (15H, m), 4.7-5.1 (8H, m), 5.10 (1H, d, $J=5.5\text{Hz}$), 5.17 (1H, d, $J=2.9\text{Hz}$), 5.25 (1H, d, $J=4.5\text{Hz}$), 5.55 (1H, d, $J=5.7\text{Hz}$), 6.7-6.9 (3H, m), 7.0-7.5 (8H, m), 7.68 (2H, d, $J=8.9\text{Hz}$), 7.73 (2H, d, $J=8.3\text{Hz}$), 8.01 (2H, d, $J=8.3\text{Hz}$), 8.10 (1H, d, $J=8.4\text{Hz}$), 8.26 (1H, d, $J=7.7\text{Hz}$), 8.8-9.0 (2H, m)

20 FAB-MASS : $m/z = 1299.5$ (M+Na)⁺

Elemental Analysis Calcd. for $\text{C}_{56}\text{H}_{69}\text{N}_8\text{O}_{23}\text{NaS}\cdot 6\text{H}_2\text{O}$:
C 48.55, H 5.89, N 8.09
25 Found : C 48.52, H 5.94, N 8.07

Example 57

IR (KBr) : 3355.5, 1662.3, 1629.6, 1267.0 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.88 (3H, t, $J=6.8\text{Hz}$), 0.93 (3H, d, $J=8.4\text{Hz}$), 0.97 (3H, d, $J=6.7\text{Hz}$), 1.2-1.5 (4H, m), 1.5-1.95 (5H, m), 2.1-2.45 (4H, m), 2.5-2.7 (4H, m), 3.17 (1H, m), 3.55-4.45 (14H, m), 4.6-5.3 (13H, m), 5.56 (1H, d, $J=5.6\text{Hz}$), 6.72 (1H, d, $J=8.1\text{Hz}$), 6.75 (1H, s), 6.77 (1H, d, $J=8.1\text{Hz}$), 7.04 (1H, s), 7.10 (1H, s), 7.2-7.45 (10H, m), 7.53 (4H, d,

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J=6.6Hz), 7.85 (1H, d, J=7Hz), 7.92 (1H, d, J=7Hz),
8.05 (1H, d, J=7Hz), 8.22 (1H, d, J=7Hz), 8.84 (1H,
s)

FAB-MASS : $m/z = 1408$ (M+Na)

5

Example 58

IR (KBr) : 3347.8, 1664.3, 1631.5, 1245.8 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.86 (3H, t, J=6.6Hz), 0.96 (3H, d,
J=6.6Hz), 1.04 (3H, d, J=5.7Hz), 1.15-2.6 (21H,
10 m), 3.16 (1H, m), 3.5-4.5 (16H, m), 4.6-5.4 (13H,
m), 5.47 (1H, d, J=5.7Hz), 6.73 (1H, d, J=8.2Hz)
6.78-6.85 (4H, m), 7.05 (1H, s), 7.10 (1H, s), 7.18
(2H, d, J=8.6Hz), 7.25-7.45 (6H, m), 7.72 (1H, d,
J=7Hz), 7.91 (1H, d, J=7Hz), 8.05 (1H, d, J=9.3Hz),
15 8.20 (1H, d, J=7Hz), 8.85 (1H, s)

FAB-MASS : $m/z = 1390$ (M+Na)

Elemental Analysis Calcd. for $\text{C}_{60}\text{H}_{82}\text{N}_9\text{O}_{24}\text{SNa}\cdot 5\text{H}_2\text{O}$:

C 49.41, H 6.36, N 8.64

Found : C 49.77, H 6.71, N 8.71

20

Example 59

IR (KBr) : 3353.6, 1670.1, 1627.6, 1247.7 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.86 (3H, t, J=6.5Hz), 0.97 (3H, d,
J=6.8Hz), 1.01 (3H, d, J=5.4Hz), 1.1-1.55 (12H, m),
25 1.55-1.95 (5H, m), 2.05-4.7 (4H, m), 3.16 (1H, m),
3.5-4.5 (16H, m), 4.6-5.3 (13H, m), 5.55 (1H, d,
J=5.6Hz), 6.7-6.9 (5H, m), 7.05 (1H, s), 7.1 (1H,
s), 7.15 (1H, d, J=8.5Hz), 7.25-7.5 (6H, m), 7.73
(1H, d, J=8.4Hz), 7.92 (1H, d, J=7Hz), 8.08 (1H, d,
30 J=8.4Hz), 8.18 (1H, d, J=7Hz), 8.84 (1H, s)

FAB-MASS : $m/z = 1390$ (M+Na)

Example 60

NMR (DMSO- d_6 , δ) : 0.85 (3H, t, J=6.6Hz), 0.96 (3H, d,
35 J=6.6Hz), 1.05 (3H, d, J=5.6Hz), 1.1-1.5 (22H, m),

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1.5-2.5 (9H, m), 2.5-3.5 (4H, m), 3.5-4.45 (14H, m), 4.45-5.45 (12H, m), 6.72 (1H, d, J=8.2Hz), 6.79 (1H, s), 6.81 (1H, d, J=8.2Hz), 7.04 (1H, s), 7.05-7.5 (8H, m), 7.9-8.3 (3H, m), 8.84 (1H, s)

5 FAB-MASS : m/z = 1325 (M+Na)

Elemental Analysis Calcd. for $C_{58}H_{89}N_8O_{22}SNa \cdot 6H_2O$:

C 49.35, H 7.14, N 7.94

Found : C 49.33, H 7.04, N 7.87

10 Example 61

IR (KBr) : 3400, 1668.1, 1629.6, 1270.9 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.96 (3H, d, J=6.8Hz), 1.06 (3H, d, J=5.7Hz), 1.1-2.0 (33H, m), 2.1-2.5 (4H, m), 3.20 (3H, s), 3.28 (2H, t, J=6.5Hz), 3.1-3.3 (1H, m), 3.6-4.45 (14H, m), 4.6-5.3 (13H, m), 5.49 (1H, d, J=6.1Hz), 6.70 (1H, s), 6.72 (1H, d, J=8.2Hz), 6.80 (1H, d, J=8.2Hz), 7.03 (1H, s), 7.0-7.1 (1H, m), 7.15 (1H, s), 7.2-7.45 (6H, m), 8.0-8.3 (3H, m), 8.83 (1H, s)

20 FAB-MASS : m/z = 1426 (M+Na)

Elemental Analysis Calcd. for $C_{62}H_{94}N_9O_{24}SNa \cdot 5H_2O$:

C 49.82, H 7.01, N 8.43

Found : C 49.86, H 7.31, N 8.40

25 Example 62

IR (KBr) : 3355.5, 1668.1, 1629.6, 1274.7 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.85 (3H, t, J=6.5Hz), 0.96 (3H, d, J=6.7Hz), 1.04 (3H, d, J=5.9Hz), 1.1-2.6 (34H, m), 3.2 (1H, m), 3.6-4.55 (14H, m), 4.7-5.3 (11H, m), 5.47 (1H, d, J=5.9Hz), 6.72 (1H, d, J=8.1Hz), 6.79 (1H, s), 6.81 (1H, d, J=8.1Hz), 7.05 (1H, s), 7.11 (1H, s), 7.2-7.5 (2H, m), 8.0-8.15 (2H, m), 8.20 (1H, d, J=8.0Hz), 8.84 (1H, s)

30 FAB-MASS : m/z = 1235 (M+Na)

35 Elemental Analysis Calcd. for $C_{51}H_{81}N_8O_{22}SNa \cdot 7H_2O$:

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C 45.73, H 7.15, N 8.37

Found : C 45.55, H 7.24, N 8.23

Example 635 IR (KBr) : 3353.6, 1664.3, 1627.6 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.6\text{Hz}$), 0.95 (3H, d, $J=6.7\text{Hz}$), 1.04 (3H, d, $J=5.7\text{Hz}$), 1.2-2.7 (30H, m), 3.16 (1H, m), 3.6-4.5 (13H, m), 4.7-5.3 (11H, m), 5.51 (1H, d, $J=6.0\text{Hz}$), 5.74 (1H, s), 6.72 (1H, d, $J=8.2\text{Hz}$), 6.75 (1H, s), 6.77 (1H, d, $J=8.2\text{Hz}$), 7.05 (1H, s), 7.2-7.5 (3H, m), 8.0-8.3 (3H, m), 8.85 (1H, s)

FAB-MASS : $m/z = 1204$ (M+Na)Elemental Analysis Calcd. for $\text{C}_{50}\text{H}_{77}\text{N}_8\text{O}_{21}\text{SNa}\cdot 5\text{H}_2\text{O}$:

15 C 47.24, H 6.90, N 8.81

Found : C 46.98, H 7.12, N 8.72

Example 64

Major product

20 IR (KBr) : 3400, 1675.8, 1631.5, 1511.9, 1234.2 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.96 (3H, d, $J=6.6\text{Hz}$), 1.05 (3H, d, $J=5.8\text{Hz}$), 1.2-1.6 (10H, m), 1.6-2.1 (5H, m), 2.1-2.7 (4H, m), 3.05-3.2 (4H, m), 3.20 (3H, s), 3.29 (2H, t, $J=6.4\text{Hz}$), 3.3-3.5 (5H, m), 3.6-4.5 (15H, m), 4.7-5.3 (11H, m), 5.50 (1H, d, $J=5.8\text{Hz}$), 6.73 (1H, d, $J=8.2\text{Hz}$), 6.8-7.1 (9H, m), 7.2-7.5 (3H, m), 7.81 (2H, d, $J=8.6\text{Hz}$), 8.08 (1H, d, $J=8.2\text{Hz}$), 8.24 (1H, d, $J=7\text{Hz}$), 8.44 (1H, d, $J=7\text{Hz}$), 8.84 (1H, s)

FAB-MASS : $m/z = 1403$ (M+Na)30 Elemental Analysis Calcd. for $\text{C}_{61}\text{H}_{85}\text{N}_{10}\text{O}_{23}\text{SNa}\cdot 9\text{H}_2\text{O}$:

C 47.47, H 6.73, N 9.07

Found : C 47.43, H 7.06, N 9.03

Minor product

35 IR (KBr) : 3350, 1668.1, 1631.5, 1511.9, 1234.2 cm^{-1}

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NMR (DMSO- d_6 , δ) : 0.96 (3H, d, $J=6.6\text{Hz}$), 1.07 (3H, d, $J=5.8\text{Hz}$), 1.2-1.5 (6H, m), 1.55-2.1 (7H, m), 2.1-2.65 (4H, m), 3.0-3.6 (9H, m), 3.7-4.5 (15H, m), 4.7-5.6 (14H, m), 5.7-6.0 (1H, m), 6.72 (1H, d, $J=8.0\text{Hz}$), 6.75-7.1 (9H, m), 7.25-7.5 (3H, m), 7.81 (2H, d, $J=8.3\text{Hz}$), 8.08 (1H, d, $J=8.2\text{Hz}$), 8.25 (1H, d, $J=7\text{Hz}$), 8.45 (1H, d, $J=7\text{Hz}$), 8.85 (1H, s)

FAB-MASS : $m/z = 1371$ (M+Na)

Elemental Analysis Calcd. for $C_{60}H_{81}N_{10}O_{22}SNa \cdot 8H_2O$:

C 48.25, H 6.55, N 9.38

Found : C 48.10, H 6.81, N 9.40

Example 65

IR (KBr) : 3450, 1668.1, 1635.3 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.88 (3H, t, $J=6.5\text{Hz}$), 0.96 (3H, d, $J=6.7\text{Hz}$), 1.06 (3H, d, $J=6\text{Hz}$), 1.2-1.5 (6H, m), 1.6-2.1 (5H, m), 2.1-2.7 (4H, m), 3.1-3.4 (9H, m), 3.6-4.5 (15H, m), 4.7-5.3 (11H, m), 5.49 (1H, d, $J=5.8\text{Hz}$), 6.73 (1H, d, $J=8.2\text{Hz}$), 6.8-7.0 (2H, m), 6.83 (2H, d, $J=9.0\text{Hz}$), 6.94 (2H, d, $J=9.0\text{Hz}$), 7.04 (1H, s), 7.12 (1H, t, $J=8.4\text{Hz}$), 7.2-7.5 (3H, m), 7.65-7.8 (2H, m), 8.09 (1H, d, $J=8.4\text{Hz}$), 8.25 (1H, d, $J=7\text{Hz}$), 8.63 (1H, d, $J=7\text{Hz}$), 8.84 (1H, s)

FAB-MASS : $m/z = 1363$ (M+Na)

Elemental Analysis Calcd. for $C_{58}H_{78}FN_{10}O_{22}SNa \cdot 5H_2O$:

C 48.67, H 6.20, N 9.79

Found : C 48.83, H 6.15, N 9.74

Example 66

IR (KBr) : 3400, 1668.1, 1635.3, 1510.0, 1240.0 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.88 (3H, t, $J=6.6\text{Hz}$), 1.2-1.5 (6H, m), 1.5-2.05 (5H, m), 2.1-2.65 (4H, m), 3.1-3.3 (9H, m), 3.6-4.5 (15H, m), 4.7-5.3 (11H, m), 5.51 (1H, d, $J=5.8\text{Hz}$), 6.73 (1H, d, $J=8.2\text{Hz}$), 6.8-6.9 (4H, m), 6.94 (2H, d, $J=9.2\text{Hz}$), 7.04 (1H, s), 7.24

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(1H, d, J=8.5Hz), 7.15-7.5 (3H, m), 7.86 (1H, dd, J=8.6 and 2.1Hz), 8.02 (1H, d, J=2.1Hz), 8.04 (1H, d, J=8.4Hz), 8.23 (1H, d, J=7Hz), 8.70 (1H, d, J=7Hz), 8.84 (1H, s)

5 FAB-MASS : m/z = 1379 (M+Na)

Elemental Analysis Calcd. for $C_{58}H_{78}ClN_{10}O_{22}SNa \cdot 6H_2O$:

C 47.52, H 6.19, N 9.55

Found : C 47.78, H 6.23, N 9.55

10 Example 67

IR (KBr) : 3400, 1670 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.96 (3H, d, J=6.7Hz), 1.05 (3H, d, J=5.7Hz), 1.4-2.65 (17H, m), 2.65-3.6 (8H, m), 3.6-4.5 (15H, m), 4.6-5.3 (11H, m), 5.44 (1H, d, J=6.0Hz), 6.73 (1H, d, J=8.2Hz), 6.81 (1H, s), 6.83 (1H, d, J=8.2Hz), 6.98 (2H, d, J=8.9Hz), 7.05 (1H, s), 7.2-7.5 (3H, m), 7.80 (2H, d, J=8.9Hz), 8.05 (1H, d, J=8.4Hz), 8.26 (1H, d, J=7Hz), 8.39 (1H, d, J=7Hz), 8.84 (1H, s)

20 FAB-MASS : m/z = 1229 (M+Na)

Elemental Analysis Calcd. for $C_{52}H_{74}N_{10}O_{21}S \cdot 5H_2O$:

C 48.14, H 6.53, N 10.80

Found : C 48.29, H 6.33, N 10.95

25 Example 68

IR (KBr) : 3400, 1652.7, 1635.3, 1511.9, 1241.9 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.88 (3H, t, J=6.6Hz), 0.97 (3H, d, J=6.7Hz), 1.09 (3H, d, J=5.7Hz), 1.2-1.5 (6H, m), 1.6-2.0 (5H, m), 2.1-2.6 (4H, m), 3.0-3.3 (5H, m), 3.6-4.6 (19H, m), 4.7-5.3 (11H, m), 5.53 (1H, d, J=5.6Hz), 6.73 (1H, d, J=8.2Hz), 6.75-7.0 (2H, m), 6.83 (2H, d, J=9.2Hz), 6.95 (2H, d, J=9.2Hz), 7.05 (1H, s), 7.12 (1H, s), 7.25-7.5 (2H, m), 7.42 (1H, d, J=9.5Hz), 7.84 (1H, d, J=9.5Hz), 7.9-8.1 (2H, m), 8.71 (1H, d, J=7Hz), 8.84 (1H, s)

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FAB-MASS : $m/z = 1347$ (M+Na)Elemental Analysis Calcd. for $C_{56}H_{77}N_{12}O_{22}SNa \cdot 7H_2O$:

C 46.34, H 6.32, N 11.58

Found : C 46.38, H 6.18, N 11.36

5

Example 69

NMR (DMSO- d_6 , δ) : 0.88 (3H, t, $J=6.6$ Hz), 0.97 (3H, d, $J=6.7$ Hz), 1.08 (3H, d, $J=5.8$ Hz), 1.2-1.5 (6H, m), 1.6-2.05 (5H, m), 2.1-2.6 (4H, m), 3.0-3.3 (5H, m), 3.4-3.55 (4H, m), 3.7-4.6 (15H, m), 4.7-5.3 (11H, m), 5.52 (1H, d, $J=5.8$ Hz), 6.73 (1H, d, $J=8.1$ Hz), 6.8-6.95 (2H, m), 6.83 (2H, d, $J=9.3$ Hz), 6.95 (2H, d, $J=9.3$ Hz) 7.05 (1H, s), 7.14 (1H, s), 7.3-7.6 (3H, m), 7.84 (1H, d, $J=8.6$ Hz), 7.95-8.1 (2H, m), 8.40 (1H, s), 8.42 (1H, d, $J=7$ Hz), 8.84 (1H, s)

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FAB-MASS : $m/z = 1346$ (M+Na)Elemental Analysis Calcd. for $C_{57}H_{78}N_{11}O_{22}SNa \cdot 5H_2O$:

C 48.40, H 6.27, N 10.89

Found : C 48.32, H 6.44, N 10.86

20

Example 70IR (KBr) : 3400, 1668.1, 1629.6, 1511.9 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.96 (3H, d, $J=6.7$ Hz), 1.06 (3H, d, $J=5.7$ Hz), 1.15-1.5 (6H, m), 1.6-2.0 (7H, m), 2.1-2.65 (5H, m), 3.1-3.5 (9H, m), 3.6-4.5 (13H, m), 4.7-5.3 (11H, m), 5.46 (1H, d, $J=5.9$ Hz), 6.73 (1H, d, $J=8.2$ Hz), 6.81 (1H, s), 6.84 (1H, d, $J=8.2$ Hz), 6.91 (2H, d, $J=8.7$ Hz), 6.95-7.05 (3H, m), 7.09 (2H, d, $J=8.7$ Hz), 7.25-7.5 (3H, m), 7.81 (2H, d, $J=8.8$ Hz), 8.09 (1H, d, $J=7$ Hz), 8.25 (1H, d, $J=7$ Hz), 8.04 (1H, d, $J=7$ Hz), 8.84 (1H, s)

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FAB-MASS : $m/z = 1327$ (M+Na)Elemental Analysis Calcd. for $C_{58}H_{77}N_{10}O_{21}SNa \cdot 5H_2O$:

C 49.92, H 6.28, N 10.03

Found : C 49.75, H 6.41, N 10.25

35

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Example 71IR (KBr) : 3350, 1668.1, 1629.6, 1511.9, 1232.3 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.85 (3H, t, $J=6.5\text{Hz}$), 0.96 (3H, d, $J=6.7\text{Hz}$), 1.06 (3H, d, $J=6.0\text{Hz}$), 1.2-1.4 (6H, m), 1.4-1.6 (2H, m), 1.7-2.1 (3H, m), 2.1-2.7 (6H, m), 3.1-3.5 (9H, m), 3.72 (2H, m), 3.8-4.5 (11H, m), 4.7-5.3 (11H, m), 5.47 (1H, d, $J=5.9\text{Hz}$), 6.73 (1H, d, $J=8.2\text{Hz}$), 6.8-6.9 (2H, m), 6.91 (2H, d, $J=8.6\text{Hz}$), 6.95-7.15 (5H, m), 7.25-7.5 (3H, m), 7.81 (2H, d, $J=8.8\text{Hz}$), 8.09 (1H, d, $J=8.4\text{Hz}$), 8.26 (1H, d, $J=7\text{Hz}$), 8.40 (1H, d, $J=7\text{Hz}$), 8.84 (1H, s)

FAB-MASS : m/z = 1329 (M+Na)Elemental Analysis Calcd. for $\text{C}_{58}\text{H}_{79}\text{N}_{10}\text{NaO}_{21}\text{S}\cdot 6\text{H}_2\text{O}$:

C 49.22, H 6.48, N 9.90

Found : C 49.33, H 6.67, N 9.89

Example 72IR (KBr) : 3450, 1668.1, 1631.5, 1240.0 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.96 (3H, d, $J=6.6\text{Hz}$), 1.05 (3H, d, $J=5.6\text{Hz}$), 1.3-1.7 (4H, m), 1.7-2.1 (7H, m), 2.1-2.73 (6H, m), 2.75-3.05 (4H, m), 3.05-4.5 (18H, m), 4.7-5.5 (12H, m), 6.72 (1H, d, $J=8.3\text{Hz}$), 6.77-6.9 (2H, m), 6.96 (2H, d, $J=8.6\text{Hz}$), 7.05 (1H, s), 7.1-7.5 (8H, m), 7.80 (2H, d, $J=8.6\text{Hz}$), 8.06 (1H, d, $J=8.4\text{Hz}$), 8.28 (1H, d, $J=7\text{Hz}$), 8.41 (1H, d, $J=7\text{Hz}$), 8.84 (1H, s)

FAB-MASS : m/z = 1305 (M+Na)Elemental Analysis Calcd. for $\text{C}_{58}\text{H}_{78}\text{N}_{10}\text{O}_{21}\text{S}\cdot 8\text{H}_2\text{O}$:

C 48.80, H 6.64, N 9.81

Found : C 48.88, H 6.50, N 9.81

Example 73IR (KBr) : 1673.9, 1646.9, 1510.0 1238.1 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.87 (3H, t, $J=6.4\text{Hz}$), 0.96 (3H, d, $J=6.6\text{Hz}$), 1.05 (3H, d, $J=5.6\text{Hz}$), 1.2-1.5 (6H, m),

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1.5-2.0 (9H, m), 2.1-2.8 (11H, m), 3.1-3.4 (5H, m),
3.4-4.5 (17H, m), 4.6-5.5 (12H, m), 6.6-7.0 (9H,
m), 7.04 (1H, s), 7.2-7.5 (3H, m), 7.78 (2H, d,
J=8.7Hz), 8.05 (1H, d, J=8.4Hz), 8.24 (1H, d,
J=7Hz), 8.39 (1H, d, J=7Hz), 8.84 (1H, s)

FAB-MASS : $m/z = 1326$ ($M^+ - SO_3 + Na$)

Elemental Analysis Calcd. for $C_{63}H_{89}N_{11}O_{22}S \cdot 9H_2O$:

C 48.92, H 6.97, N 9.96

Found : C 48.77, H 6.73, N 9.94

Example 74

IR (KBr) : 3450, 1670.1, 1631.5, 1280.5 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.87 (3H, t, J=7.0Hz), 0.96 (3H, t,
J=6.8Hz), 1.05 (3H, d, J=5.6Hz), 1.1-1.65 (13H, m),
1.65-2.1 (7H, m), 2.1-2.65 (5H, m), 3.17 (1H, m),
3.6-4.5 (13H, m), 4.7-5.3 (11H, m), 5.49 (1H, d,
J=5.9Hz), 6.72 (1H, d, J=8.2Hz), 6.82 (1H, d,
J=8.2Hz), 6.84 (1H, s), 7.04 (1H, s), 7.29 (2H, d,
J=8.3Hz), 7.2-7.5 (3H, m), 7.80 (2H, d, J=8.3Hz),
8.10 (1H, d, J=8.4Hz), 8.26 (1H, d, J=7Hz), 8.65
(1H, d, J=7Hz), 8.84 (1H, s)

FAB-MASS : $m/z = 1237$ (M+Na)

Elemental Analysis Calcd. for $C_{53}H_{75}N_8O_{21}SNa \cdot 6H_2O$:

C 48.10, H 6.63, N 8.47

Found : C 48.26, H 6.62, N 8.46

Example 75

IR (KBr) : 3400, 1670.1, 1627.6, 1272.8 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.96 (3H, d, J=3.3Hz), 1.08 (3H, d,
J=5.7Hz), 1.2-1.6 (10H, m), 1.6-2.1 (5H, m), 2.1-
2.7 (4H, m), 3.0-3.3 (1H, m), 3.20 (3H, s), 3.29
(2H, t, J=6.4Hz), 3.73 (2H, m), 3.9-4.6 (13H, m),
4.7-5.3 (11H, m), 5.53 (1H, d, J=5.8Hz), 6.73 (1H,
d, J=8.3Hz), 6.83 (1H, d, J=8.3Hz), 6.91 (1H, s),
7.05 (1H, s), 7.23 (1H, dd, J=9.0 and 2.3Hz), 7.3-

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7.5 (4H, m), 7.8-8.0 (3H, m), 8.09 (1H, d,
J=8.4Hz), 8.33 (1H, d, J=7Hz), 8.44 (1H, s), 8.80
(1H, d, J=7Hz), 8.85 (1H, s)

FAB-MASS : $m/z = 1293$ (M+Na)

5 Elemental Analysis Calcd. for $C_{55}H_{75}N_8O_{23}SNa \cdot 6H_2O$:

C 47.89, H 6.36, N 8.12

Found : C 47.81, H 6.26, N 8.05

Example 76

10 IR (KBr) : 3361.3, 1668.1, 1635.3, 1627.6 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.86 (3H, t, J=6.7Hz), 0.96 (3H, d,
J=6.7Hz), 1.09 (3H, d, J=5.8Hz), 1.19-1.25 (8H, m),
1.25-2.00 (5H, m), 2.02-2.53 (4H, m), 2.44 (3H, s),
2.61 (2H, t, J=7.6Hz), 3.05-3.27 (1H, m), 3.55-4.50
15 (13H, m), 4.65-5.65 (12H, m), 6.42 (1H, s), 6.65-
6.95 (3H, m), 7.05 (1H, d, J=0.4Hz), 7.13-7.50 (5H,
m), 7.50-7.88 (6H, m), 8.10 (1H, d, J=9.0Hz), 8.25
(1H, d, J=8.4Hz), 8.40 (1H, d, J=7.0Hz), 8.85 (1H,
s)

20 FAB-MASS : $m/z = 1299.3$ (M+Na-1)

Elemental Analysis Calcd. for $C_{58}H_{77}N_8NaO_{21}S \cdot 5H_2O$:

C 50.94, H 6.41, N 8.19

Found : C 50.99, H 6.40, N 8.15

25 Example 77

IR (Nujol) : 3351.7, 1670.1, 1652.7, 1623.8 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.86 (3H, t, J=6.7Hz), 0.96 (3H, d,
J=6.7Hz), 1.06 (3H, d, J=5.8Hz), 1.13-1.45 (8H, m),
1.47-1.96 (5H, m), 2.06-2.66 (8H, m), 2.81 (2H, t,
30 J=7.6Hz), 3.04-3.30 (1H, m), 3.53-4.50 (13H, m),
4.53-5.70 (12H, m), 6.64-6.88 (3H, m), 7.04 (1H, d,
J=0.4Hz), 7.13-7.60 (11H, m), 8.10 (1H, d,
J=9.0Hz), 8.18 (1H, d, J=8.4Hz), 8.30 (1H, d,
J=7.0Hz), 8.85 (1H, s)

35 FAB-MASS : $m/z = 1287.4$ (M+Na-1)

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Elemental Analysis Calcd. for $C_{57}H_{77}N_8NaO_{21}S \cdot 5H_2O$:

C 50.51, H 6.46, N 8.27

Found : C 50.84, H 6.60, N 8.33

5 Example 78IR (KBr) : 3361.3, 1683.6, 1670.1, 1662.3, 1652.7,
1646.9, 1635.3, 1627.6, 1623.8 cm^{-1}

10 NMR (DMSO- d_6 , δ) : 0.97 (3H, d, $J=6.7Hz$), 1.07 (3H, d,
 $J=5.6Hz$), 1.28-2.00 (13H, m), 2.08-2.60 (4H, m),
3.07-3.30 (1H, m), 3.60-4.66 (17H, m), 4.66-5.12
(9H, m), 5.11 (1H, d, $J=3.1Hz$), 5.25 (1H, d,
 $J=4.6Hz$), 5.52 (1H, d, $J=6.0Hz$), 6.62-6.95 (4H, m),
6.95-7.15 (3H, m), 7.20-7.50 (3H, m), 7.50-7.85
(7H, m), 8.12 (1H, d, $J=8.4Hz$), 8.35 (1H, d,
15 $J=7.7Hz$), 8.53 (1H, d, $J=7.0Hz$), 8.85 (1H, s)

FAB-MASS : $m/z = 1319.7$ ($M+Na-1$)Elemental Analysis Calcd. for $C_{57}H_{74}N_8NaO_{22}SF \cdot 8H_2O$:

C 47.49, H 6.29, N 7.77

Found : C 47.79, H 6.16, N 7.93

20 Example 79IR (KBr) : 3354.9, 1668.1, 1662.3, 1654.6, 1646.9,
1627.6 cm^{-1}

25 NMR (DMSO- d_6 , δ) : 0.85 (3H, t, $J=6.7Hz$), 0.90-1.10
(6H, m), 1.10-1.40 (8H, m), 1.48-1.95 (5H, m),
2.05-2.46 (4H, m), 2.60 (2H, t, $J=7.6Hz$), 3.07-3.23
(1H, m), 3.55-4.45 (14H, m), 4.67-5.32 (11H, m),
5.48-5.63 (1H, m), 6.22 (1H, , $J=5.3Hz$), 6.65-6.89
(3H, m), 6.97-7.15 (2H, m), 7.20-7.68 (10H, m),
30 7.85-8.20 (3H, m), 8.84 (1H, s)

FAB-MASS : $m/z = 1289.4$ ($M+Na-1$)Elemental Analysis Calcd. for $C_{56}H_{75}N_8NaO_{22}S \cdot 3H_2O$:

C 50.90, H 6.18, N 8.48

Found : C 50.80, H 6.44, N 8.29

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Example 80IR (KBr) : 3361.3, 1664.3, 1631.5, 1600.6 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.7\text{Hz}$), 0.98 (3H, d, $J=6.7\text{Hz}$), 1.16 (3H, t, $J=5.9\text{Hz}$), 1.20-1.45 (8H, m),
5 1.50-1.70 (2H, m), 1.70-2.05 (3H, m), 2.10-2.57 (4H, m), 2.63 (2H, t, $J=7.6\text{Hz}$), 3.10-3.30 (1H, m),
3.68-4.50 (13H, m), 4.78-5.32 (11H, m), 5.66 (1H, d, $J=5.7\text{Hz}$), 6.68-7.02 (3H, m), 7.04 (1H, d, $J=0.4\text{Hz}$), 7.25-7.48 (4H, m), 7.60-8.08 (7H, m),
10 8.10 (1H, d, $J=8.4\text{Hz}$), 8.28 (1H, d, $J=7.7\text{Hz}$), 8.85 (1H, s), 9.30 (1H, d, $J=7.1\text{Hz}$)

FAB-MASS : $m/z = 1287.5$ ($M+\text{Na}-1$)Elemental Analysis Calcd. for $\text{C}_{55}\text{H}_{73}\text{N}_8\text{NaO}_{22}\text{S}\cdot 3\text{H}_2\text{O}$:

C 50.53, H 6.09, N 8.57

15 Found : C 50.66, H 6.01, N 8.22

Example 81IR (KBr) : 3349.7, 1668.1, 1627.6 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.85 (3H, t, $J=6.7\text{Hz}$), 0.96 (3H, d, $J=6.7\text{Hz}$), 1.09 (3H, d, $J=5.8\text{Hz}$), 1.18-1.48 (8H, m),
20 1.50-2.10 (5H, m), 2.10-2.45 (3H, m), 2.50-2.65 (1H, m), 2.77 (2H, t, $J=7.6\text{Hz}$), 3.05-3.25 (1H, m),
3.60-4.65 (13H, m), 4.67-5.60 (12H, m), 6.65-6.97 (3H, m), 7.05 (1H, d, $J=0.4\text{Hz}$), 7.21-7.43 (4H, m),
25 7.76 (1H, s), 7.83-8.05 (3H, m), 8.10 (1H, d, $J=9.0\text{Hz}$), 8.29 (1H, d, $J=8.4\text{Hz}$), 8.48 (1H, s),
8.64-9.03 (2H, m)

FAB-MASS : $m/z = 1233.0$ ($M+\text{Na}-1$)Elemental Analysis Calcd. for $\text{C}_{53}\text{H}_{71}\text{N}_8\text{NaO}_{20}\text{S}\cdot 3\text{H}_2\text{O}$:

C 50.96, H 6.22, N 8.96

30 Found : C 50.62, H 6.40, N 8.92

Example 82IR (KBr) : 3361.3, 1670.1, 1627.6 cm^{-1} 35 NMR (DMSO- d_6 , δ) : 0.88 (3H, t, $J=6.7\text{Hz}$), 0.96 (3H, d,

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J=6.7Hz), 1.09 (3H, d, J=5.9Hz), 1.18-1.43 (6H, m),
1.50-2.10 (5H, m), 2.10-2.69 (4H, m), 2.77 (2H, t,
J=7.6Hz), 3.07-3.29 (1H, m), 3.60-4.62 (13H, m),
4.69-5.23 (10H, m), 5.27 (1H, d, J=4.5Hz), 5.55
(1H, d, J=5.9Hz), 6.68-7.00 (3H, m), 7.05 (1H, d,
J=0.4Hz), 7.25-7.53 (4H, m), 7.76 (1H, s), 7.84-
8.05 (3H, m), 8.13 (1H, d, J=8.4Hz), 8.33 (1H, d,
J=7.7Hz), 8.48 (1H, s), 8.73-9.00 (2H, m)

FAB-MASS : m/z = 1219.4 (M+Na-1)

Elemental Analysis Calcd. for $C_{52}H_{69}N_8NaO_{21}S \cdot 5H_2O$:

C 48.51, H 6.19, N 8.71

Found : C 48.67, H 6.34, N 8.74

Example 83

IR (KBr) : 3357.5, 1668.1, 1627.6 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.97 (3H, d, J=6.7Hz), 1.07 (3H, d,
J=6.0Hz), 1.20-1.62 (10H, m), 1.62-2.00 (5H, m),
2.10-2.65 (4H, m), 3.20 (3H, s), 3.08-3.45 (1H, m),
3.28 (2H, t, J=6.5Hz), 3.53-4.50 (15H, m), 4.68-
5.13 (9H, m), 5.17 (1H, d, J=3.1Hz), 5.25 (1H, d,
J=4.4Hz), 5.53 (1H, d, J=6.0Hz), 6.68-6.95 (4H, m),
6.95-7.11 (3H, m), 7.20-7.52 (3H, m), 7.55-7.95
(7H, m), 8.13 (1H, d, J=8.4Hz), 8.30 (1H, d,
J=7.7Hz), 8.52 (1H, d, J=7.0Hz), 8.85 (1H, s)

FAB-MASS : m/z = 1345.2 (M+Na-1)

Elemental Analysis Calcd. for $C_{59}H_{79}N_8NaO_{23}S \cdot 8H_2O$:

C 48.29, H 6.53, N 7.64

Found : C 48.44, H 6.58, N 7.75

Example 84

IR (KBr) : 3353.6, 1662.3, 1627.6 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.96 (3H, d, J=6.7Hz), 1.07 (3H, d,
J=5.5Hz), 1.40-1.65 (2H, m), 1.65-2.00 (5H, m),
2.00-2.67 (6H, m), 3.08-3.30 (1H, m), 3.50-4.50
(15H, m), 4.68-5.13 (11H, m), 5.18 (1H, d,

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J=3.1Hz), 5.26 (1H, d, J=4.5Hz), 5.53 (1H, d, J=6.0Hz), 5.70-6.00 (1H, m), 6.63-6.95 (4H, m), 6.95-7.13 (3H, m), 7.20-7.52 (3H, m), 7.52-7.95 (7H, m), 8.12 (1H, d, J=8.4Hz), 8.31 (1H, d, J=7.7Hz), 8.53 (1H, d, J=7.0Hz), 8.85 (1H, s)

FAB-MASS : m/z = 1285.4 (M+Na-1)

Elemental Analysis Calcd. for $C_{56}H_{71}N_8O_{22}SNa \cdot 8H_2O$:

C 47.79, H 6.23, N 7.96

Found : C 47.59, H 6.32, N 8.06

Example 85

IR (KBr) : 3363.2, 1670.1, 1627.6 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.89 (6H, d, J=6.5Hz), 0.96 (3H, d, J=6.7Hz), 1.07 (3H, d, J=5.7Hz), 1.22-1.41 (2H, m), 1.50-1.97 (6H, m), 2.11-2.65 (4H, m), 3.10-3.30 (1H, m), 3.60-4.50 (15H, m), 4.70-5.08 (8H, m), 5.10 (1H, d, J=5.6Hz), 5.16 (1H, d, J=3.1Hz), 5.25 (1H, d, J=4.5Hz), 5.50 (1H, d, J=5.9Hz), 6.65-6.92 (4H, m), 6.92-7.12 (3H, m), 7.21-7.50 (3H, m), 7.52-7.90 (7H, m), 8.12 (1H, d, J=8.4Hz), 8.30 (1H, d, J=7.7Hz), 8.56 (1H, d, J=7.0Hz), 8.85 (1H, s)

FAB-MASS : m/z = 1287.6 (M+Na-1)

Elemental Analysis Calcd. for $C_{56}H_{73}N_8NaO_{22}S \cdot 6.5H_2O$:

C 48.66, H 6.27, N 8.11

Found : C 48.67, H 6.32, N 8.20

Example 86

IR (KBr) : 3361.3, 1683.6, 1670.1, 1654.6, 1635.3, 1623.8 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.97 (3H, d, J=6.7Hz), 1.07 (3H, d, J=5.6Hz), 1.30-2.00 (11H, m), 2.10-2.70 (4H, m), 3.05-3.15 (1H, m), 3.55-4.70 (17H, m), 4.70-5.11 (9H, m), 5.16 (1H, d, J=3.1Hz), 5.25 (1H, d, J=4.5Hz), 5.52 (1H, d, J=6.0Hz), 6.65-6.95 (4H, m), 6.95-7.10 (3H, m), 7.10-7.50 (3H, m), 7.50-7.85

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(7H, m), 8.12 (1H, d, $J=8.4\text{Hz}$), 8.30 (1H, d,
 $J=8.3\text{Hz}$), 8.52 (1H, d, $J=7.0\text{Hz}$), 8.85 (1H, s)

FAB-MASS : $m/z = 1305.2$ ($M+\text{Na}-1$)

Elemental Analysis Calcd. for $\text{C}_{56}\text{H}_{72}\text{N}_8\text{NaO}_{22}\text{SF}\cdot 6\text{H}_2\text{O}$:

C 48.34, H 6.09, N 8.05

Found : C 48.47, H 6.29, N 7.95

Example 87

IR (KBr) : 3359.4, 1668.1, 1654.6, 1625.7 cm^{-1}

NMR ($\text{DMSO}-d_6$, δ) : 0.97 (3H, d, $J=6.7\text{Hz}$), 1.07 (3H, d,
 $J=6.0\text{Hz}$), 1.22-1.62 (6H, m), 1.62-2.00 (5H, m),
2.10-2.65 (4H, m), 3.20 (3H, s), 3.05-3.40 (1H, m),
3.31 (2H, t, $J=6.5\text{Hz}$), 3.60-4.55 (15H, m), 4.65-
5.13 (9H, m), 5.16 (1H, d, $J=3.1\text{Hz}$), 5.26 (1H, d,
 $J=4.4\text{Hz}$), 5.53 (1H, d, $J=6.0\text{Hz}$), 6.68-6.95 (4H, m),
6.95-7.20 (3H, m), 7.20-7.58 (3H, m), 7.58-7.90
(7H, m), 8.13 (1H, d, $J=8.4\text{Hz}$), 8.32 (1H, d,
 $J=7.7\text{Hz}$), 8.53 (1H, d, $J=7.0\text{Hz}$), 8.85 (1H, s)

FAB-MASS : $m/z = 1317.6$ ($M+\text{Na}-1$)

Elemental Analysis Calcd. for $\text{C}_{57}\text{H}_{75}\text{N}_8\text{NaO}_{23}\text{S}\cdot 7\text{H}_2\text{O}$:

C 48.16, H 6.31, N 7.88

Found : C 48.21, H 6.60, N 7.78

Example 88

IR (KBr) : 3350, 2954, 1668, 1629, 1538, 1511, 1454,
1249 cm^{-1}

NMR ($\text{DMSO}-d_6$, δ) : 0.88 (3H, t, $J=7.1\text{Hz}$), 0.96 (3H, d,
 $J=7.5\text{Hz}$), 1.08 (2H, d, $J=5.7\text{Hz}$), 1.2-1.5 (6H, m),
1.6-2.4 (8H, m), 2.6-2.7 (1H, m), 3.1-3.3 (1H, m),
3.6-4.5 (19H, m), 4.7-5.3 (8H, m), 6.73 (1H, d,
 $J=8.2\text{Hz}$), 6.8-7.1 (5H, m), 7.19 (1H, s), 7.3-7.5
(3H, m), 7.75 (2H, d, $J=8.7\text{Hz}$), 7.8-8.0 (4H, m),
8.08 (1H, d, $J=8.9\text{Hz}$), 8.30 (1H, d, $J=7.7\text{Hz}$), 8.7-
9.0 (3H, m)

FAB-MASS : $m/z = 1327$ ($M+\text{Na}^+$)

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Elemental Analysis Calcd. for $C_{57}H_{73}N_{10}O_{22}NaS \cdot 9H_2O$:

C 46.65, H 6.25, N 9.54

Found : C 46.95, H 6.22, N 9.55

5 Example 89IR (KBr) : 3376, 2931, 2858, 1662, 1631, 1521, 1444,
1245, 1047 cm^{-1}

10 NMR (DMSO- d_6 , δ) : 0.97 (3H, d, $J=6.7Hz$), 1.09 (3H, d,
 $J=5.9Hz$), 1.3-1.6 (6H, m), 1.7-2.1 (5H, m), 2.2-2.4
(3H, m), 2.5-2.6 (1H, m), 3.21 (3H, s), 3.2-3.4
(3H, m), 3.6-4.5 (16H, m), 4.79 (2H, d, $J=6.0Hz$),
4.9-5.2 (5H, m), 5.10 (1H, d, $J=3.6Hz$), 5.18 (1H,
d, $J=3.1Hz$), 5.26 (1H, d, $J=4.5Hz$), 5.53 (1H, d,
15 $J=6.0Hz$), 6.73 (1H, d, $J=8.2Hz$), 6.8-7.0 (2H, m),
7.0-7.2 (3H, m), 7.3-7.5 (3H, m), 7.6-7.9 (8H, m),
8.01 (2H, d, $J=8.4Hz$), 8.12 (1H, d, $J=8.4Hz$), 8.31
(1H, d, $J=7.7Hz$), 8.79 (1H, d, $J=7.0Hz$), 8.85 (1H,
s)

FAB-MASS : $m/z = 1367 (M+Na^+)$

20 Elemental Analysis Calcd. for $C_{61}H_{77}N_8O_{23}NaS \cdot 6.5H_2O$:
C 50.10, H 6.20, N 7.66
Found : C 50.09, H 6.17, N 7.62

Example 90

25 IR (KBr) : 3363, 2937, 2869, 1646, 1444, 1255 cm^{-1}

30 NMR (DMSO- d_6 , δ) : 0.97 (3H, d, $J=6.7Hz$), 1.08 (3H, d,
 $J=5.7Hz$), 1.2-1.6 (10H, m), 1.7-2.1 (5H, m), 2.1-
2.4 (3H, m), 2.5-2.7 (1H, m), 3.20 (3H, s), 3.2-3.4
(1H, m), 3.6-4.6 (16H, m), 4.7-5.2 (8H, m), 5.16
(1H, d, $J=3.1Hz$), 5.24 (1H, d, $J=4.5Hz$), 5.54 (1H,
d, $J=5.8Hz$), 6.73 (1H, d, $J=8.2Hz$), 6.8-7.0 (2H,
m), 7.1-7.4 (6H, m), 7.97 (2H, d, $J=8.8Hz$), 8.0-8.4
(6H, m), 8.84 (1H, s), 8.92 (1H, d, $J=7.0Hz$)

FAB-MASS : $m/z = 1403.6 (M+Na^+)$

35 Elemental Analysis Calcd. for $C_{59}H_{77}N_{10}O_{23}NaS_2 \cdot 6H_2O$:

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C 47.58, H 6.02, N 9.40

Found : C 47.72, H 6.12, N 9.42

Example 91

5 IR (KBr) : 3350, 1668, 1654, 1625, 1537, 1521, 1245,
1047 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.9-1.1 (6H, m), 1.07 (3H, d,
J=5.7Hz), 1.4-2.0 (7H, m), 2.2-2.5 (3H, m), 2.5-2.6
(1H, m), 3.1-3.3 (1H, m), 3.6-4.5 (16H, m), 4.7-5.1
10 (7H, m), 5.09 (1H, d, J=5.6Hz), 5.16 (1H, d,
J=3.1Hz), 5.25 (1H, d, J=4.4Hz), 5.53 (1H, d,
J=6.0Hz), 6.73 (1H, d, J=8.4Hz), 6.8-7.2 (6H, m)
7.2-7.5 (4H, m), 7.5-7.8 (6H, m), 8.11 (1H, d,
J=8.4Hz), 8.32 (1H, d, J=7.7Hz), 8.54 (1H, d,
15 J=7.0Hz), 8.84 (1H, s)

FAB-MASS : $m/z = 1259$ ($M+Na^+$)Elemental Analysis Calcd. for $C_{54}H_{69}N_8O_{22}Na \cdot 8H_2O$:

C 46.95, H 6.20, N 8.11

Found : C 47.20, H 6.23, N 8.28

Example 92

IR (KBr) : 3359, 2929, 2852, 1668, 1650, 1631, 1538,
1515 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.96 (3H, d, J=6.7Hz), 1.09 (3H, d,
25 J=6.1Hz), 1.2-1.6 (5H, m), 1.6-2.5 (10H, m), 2.5-
2.6 (1H, m), 3.18 (1H, m), 3.7-4.5 (15H, m), 4.8-
5.2 (8H, m), 5.17 (1H, d, J=3.1Hz), 5.26 (1H, d,
J=4.5Hz), 5.55 (1H, d, J=5.9Hz), 6.73 (1H, d,
J=8.1Hz), 6.81 (1H, s), 6.85 (1H, s), 7.05 (1H, s),
30 7.2-7.4 (3H, m), 7.45 (2H, d, J=8.2Hz), 7.96 (2H,
d, J=8.2Hz), 8.0-8.2 (4H, s), 8.2-8.3 (1H, m), 8.85
(1H, s), 8.9-9.0 (1H, d, J=7.0Hz)

FAB-MASS : $m/z = 1327.5$ ($M+Na$)⁺Elemental Analysis Calcd. for $C_{56}H_{69}N_{10}O_{21}S_2Na \cdot 6H_2O$:

C 47.59, H 5.78, N 9.91

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Found : C 47.89, H 5.76, N 9.93

Example 93IR (KBr) : 3350, 1654, 1629, 1517, 1249, 1047 cm^{-1}

5 NMR (DMSO- d_6 , δ) : 0.9-1.1 (6H, m), 1.11 (3H, d, $J=5.9\text{Hz}$), 1.6-2.0 (5H, s), 2.1-2.4 (3H, s), 2.6-2.7 (1H, m), 3.1-3.3 (1H, m), 3.6-4.5 (16H, m), 4.7-5.2 (7H, m), 5.10 (1H, d, $J=5.6\text{Hz}$), 5.17 (1H, d, $J=3.1\text{Hz}$), 5.25 (1H, d, $J=4.5\text{Hz}$), 5.55 (1H, d, $J=5.7\text{Hz}$), 6.7-6.9 (3H, m), 7.0-7.5 (6H, m), 7.74 (2H, d, $J=8.8\text{Hz}$), 7.91 (2H, d, $J=8.5\text{Hz}$), 8.1-8.4 (8H, m), 8.84 (1H, s), 8.97 (1H, d, $J=7.0\text{Hz}$)

FAB-MASS : $m/z = 1363.5$ ($M+\text{Na}$)⁺

15 Elemental Analysis Calcd. for $\text{C}_{59}\text{H}_{69}\text{N}_{10}\text{O}_{23}\text{SNa}\cdot 5\text{H}_2\text{O}$:
C 49.51, H 5.56, N 9.79
Found : C 49.39, H 5.63, N 9.77

Example 94

20 IR (KBr) : 3355, 2929, 2856, 1664, 1631, 1519, 1440,
1282 cm^{-1}

25 NMR (DMSO- d_6 , δ) : 0.84 (3H, t, $J=6.7\text{Hz}$), 0.96 (3H, d, $J=6.7\text{Hz}$), 1.07 (3H, t, $J=5.8\text{Hz}$), 1.2-1.5 (12H, m), 1.7-2.0 (5H, m), 2.2-2.4 (3H, m), 2.5-2.7 (1H, m), 2.94 (2H, t, $J=7.4\text{Hz}$), 3.1-3.3 (1H, m), 3.6-4.6 (14H, m), 4.8-5.2 (7H, m), 5.10 (1H, d, $J=3.6\text{Hz}$), 5.17 (1H, d, $J=3.1\text{Hz}$), 5.26 (1H, d, $J=4.5\text{Hz}$), 5.55 (1H, d, $J=5.9\text{Hz}$), 6.73 (1H, d, $J=8.2\text{Hz}$), 6.8-7.0 (2H, m), 7.0-7.5 (4H, m), 8.0-8.2 (5H, m), 8.27 (1H, d, $J=7.7\text{Hz}$), 8.85 (1H, s), 8.93 (1H, d, $J=7.0\text{Hz}$)

FAB-MASS : $m/z = 1279$ ($M+\text{Na}^+$)

35 Elemental Analysis Calcd. for $\text{C}_{53}\text{H}_{73}\text{N}_{10}\text{O}_{22}\text{SNa}\cdot 5.5\text{H}_2\text{O}$:
C 46.93, H 6.24, N 10.33
Found : C 46.93, H 6.46, N 10.31

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Example 95IR (KBr) : 3363, 1673, 1648, 1538, 1253 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.92 (3H, t, $J=6.8\text{Hz}$), 0.97 (3H, d, $J=6.8\text{Hz}$), 1.10 (3H, d, $J=5.8\text{Hz}$), 1.2-1.5 (6H, m), 1.7-2.1 (5H, m), 2.1-2.4 (3H, m), 2.5-2.6 (1H, m), 3.1-3.3 (1H, m), 3.6-4.5 (16H, m), 4.7-5.1 (9H, m), 5.16 (1H, d, $J=3.1\text{Hz}$), 5.24 (1H, d, $J=4.5\text{Hz}$), 5.54 (1H, d, $J=5.8\text{Hz}$), 6.73 (1H, d, $J=8.2\text{Hz}$), 6.8-7.4 (8H, m), 8.04 (2H, d, $J=8.8\text{Hz}$), 8.13 (2H, d, $J=8.6\text{Hz}$), 8.2-8.4 (4H, m), 8.84 (1H, s), 8.98 (1H, d, $J=7.0\text{Hz}$)

FAB-MASS : $m/z = 1329.6$ ($M+\text{Na}$)⁺Elemental Analysis Calcd. for $\text{C}_{56}\text{H}_{71}\text{N}_{10}\text{O}_{23}\text{SNa}\cdot 7\text{H}_2\text{O}$:

C 46.92, H 5.97, N 9.77

Found : C 46.86, H 5.99, N 9.77

Example 96IR (KBr) : 3355, 2929, 1666, 1648, 1631, 1515, 1442, 1047 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.87 (3H, t, $J=6.7\text{Hz}$), 0.97 (3H, d, $J=6.7\text{Hz}$), 1.10 (3H, d, $J=5.8\text{Hz}$), 1.2-1.5 (10H, m), 1.7-2.1 (5H, m), 2.1-2.4 (3H, m), 2.5-2.6 (1H, m), 3.1-3.3 (1H, m), 3.6-4.6 (16H, m), 4.79 (2H, d, $J=5.9\text{Hz}$), 4.8-5.2 (5H, m), 5.09 (1H, d, $J=5.5\text{Hz}$), 5.16 (1H, d, $J=3.1\text{Hz}$), 5.23 (1H, d, $J=4.5\text{Hz}$), 5.53 (1H, d, $J=5.9\text{Hz}$), 6.73 (1H, d, $J=8.0\text{Hz}$), 6.8-6.9 (2H, m), 7.0-7.5 (6H, m), 7.97 (2H, d, $J=8.8\text{Hz}$), 8.0-8.3 (6H, m), 8.83 (1H, s), 8.88 (1H, d, $J=7.0\text{Hz}$)

FAB-MASS : $m/z = 1373.5$ ($M+\text{Na}$)⁺Elemental Analysis Calcd. for $\text{C}_{58}\text{H}_{75}\text{N}_{10}\text{O}_{22}\text{S}_2\text{Na}\cdot 6\text{H}_2\text{O}$:

C 47.73, H 6.01, N 9.60

Found : C 47.57, H 5.92, N 9.53

Example 97

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IR (KBr) : 3361, 2925, 2852, 1668, 1650, 1631, 1538,
1452, 1049 cm^{-1}

5 NMR (DMSO- d_6 , δ) : 0.87 (3H, t, $J=6.9\text{Hz}$), 0.96 (3H, d,
 $J=6.7\text{Hz}$), 1.08 (3H, d, $J=5.7\text{Hz}$), 1.2-1.4 (11H, m),
1.4-1.6 (2H, m), 1.7-2.1 (5H, m), 2.1-2.5 (5H, m),
2.5-2.6 (1H, m), 3.1-3.3 (2H, m), 3.7-4.5 (14H, m),
4.7-5.0 (7H, m), 5.09 (1H, d, $J=5.6\text{Hz}$), 5.16 (1H,
d, $J=3.1\text{Hz}$), 5.25 (1H, d, $J=4.5\text{Hz}$), 5.54 (1H, d,
 $J=5.8\text{Hz}$), 6.73 (1H, d, $J=8.2\text{Hz}$), 6.8-7.0 (2H, d),
10 7.04 (1H, s), 7.2-7.5 (3H, m), 8.03 (4H, s), 8.0-
8.3 (2H, m), 8.84 (1H, s), 8.95 (1H, d, $J=7.0\text{Hz}$)

FAB-MASS : $m/z = 1321.9$ ($M+\text{Na}^+$)⁺

Elemental Analysis Calcd. for $\text{C}_{55}\text{H}_{75}\text{N}_{10}\text{O}_{21}\text{S}_2\text{Na}\cdot 5\text{H}_2\text{O}$:

15 C 47.54, H 6.17, N 10.08
Found : C 47.38, H 6.12, N 9.98

Example 98

IR (KBr) : 3374, 2937, 2875, 1658, 1629, 1531, 1436,
1255, 1047 cm^{-1}

20 NMR (DMSO- d_6 , δ) : 0.9-1.11 (6H, m), 1.09 (3H, d,
 $J=5.7\text{Hz}$), 1.2-1.5 (4H, m), 1.7-2.1 (5H, m), 2.2-2.5
(3H, m), 2.6-2.7 (1H, m), 3.2-3.3 (1H, m), 3.6-4.5
(16H, m), 4.80 (2H, d, $J=5.8\text{Hz}$), 4.8-5.2 (5H, m),
5.10 (1H, d, $J=5.5\text{Hz}$), 5.17 (1H, d, $J=3.0\text{Hz}$), 5.24
25 (1H, d, $J=4.5\text{Hz}$), 5.53 (1H, d, $J=5.8\text{Hz}$), 6.73 (1H,
d, $J=8.2\text{Hz}$), 6.8-7.0 (2H, m), 7.06 (1H, s), 7.10
(2H, d, $J=8.9\text{Hz}$), 7.2-7.5 (3H, m), 7.68 (1H, s),
7.86 (2H, d, $J=8.8\text{Hz}$), 8.0-8.4 (6H, m), 8.84 (1H,
s), 8.90 (1H, d, $J=7.0\text{Hz}$)

30 FAB-MASS : $m/z = 1314$ ($M+\text{Na}^+$)

Elemental Analysis Calcd. for $\text{C}_{56}\text{H}_{70}\text{N}_9\text{O}_{23}\text{NaS}\cdot 6\text{H}_2\text{O}$:

C 48.03, H 5.90, N 9.00
Found : C 47.92, H 5.83, N 8.88

35 Example 99

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IR (KBr) : 3345, 1646, 1633, 1531, 1257 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.97 (3H, d, $J=6.7\text{Hz}$), 1.11 (3H, d, $J=5.7\text{Hz}$), 1.2-1.6 (10H, m), 1.7-2.5 (8H, m), 2.6-2.7 (1H, m), 3.21 (3H, s), 3.3-3.4 (1H, m), 3.7-4.6 (16H, m), 4.8-5.2 (8H, m), 5.16 (1H, d, $J=3.1\text{Hz}$), 5.24 (1H, d, $J=4.5\text{Hz}$), 5.55 (1H, d, $J=5.7\text{Hz}$), 6.7-6.9 (3H, m), 7.0-7.5 (6H, m), 8.0-8.3 (8H, m), 8.84 (1H, s), 8.96 (1H, d, $J=7.0\text{Hz}$)

FAB-MASS : $m/z = 1387.7$ ($\text{M}+\text{Na}^+$)10 Elemental Analysis Calcd. for $\text{C}_{59}\text{H}_{77}\text{N}_{10}\text{O}_{24}\text{NaS}\cdot 6\text{H}_2\text{O}$:

C 48.09, H 6.09, N 9.51

Found : C 47.81, H 5.83, N 9.38

Example 10015 IR (KBr) : 3357, 1668, 1631, 1429, 1284, 1047 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.97 (3H, d, $J=6.7\text{Hz}$), 1.09 (3H, d, $J=5.8\text{Hz}$), 1.8-2.4 (6H, m), 2.5-2.6 (1H, m), 3.1-3.2 (1H, m), 3.7-4.6 (14H, m), 4.7-5.2 (7H, m), 5.10 (1H, d, $J=5.5\text{Hz}$), 5.17 (1H, d, $J=3.1\text{Hz}$), 5.24 (1H, d, $J=5.5\text{Hz}$), 5.53 (1H, d, $J=5.8\text{Hz}$), 6.75 (1H, d, $J=8.2\text{Hz}$), 6.8-6.9 (2H, m), 7.05 (1H, s), 7.3-7.6 (9H, m), 7.8-7.9 (4H, m), 8.0-8.2 (5H, m), 8.2-8.3 (1H, m), 8.34 (1H, d, $J=9.3\text{Hz}$), 8.7-8.8 (1H, m), 8.85 (1H, s)

25 FAB-MASS : $m/z = 1332.7$ ($\text{M}+\text{Na}^+$)Elemental Analysis Calcd. for $\text{C}_{58}\text{H}_{65}\text{N}_{10}\text{O}_{22}\text{SNa}\cdot 8\text{H}_2\text{O}$:

C 47.93, H 5.62, N 9.64

Found : C 47.83, H 5.53, N 9.56

30 Example 101

IR (KBr) : 3353, 2929, 2856, 1666, 1631, 1612, 1496, 1440, 1259 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.87 (3H, t, $J=6.6\text{Hz}$), 0.97 (3H, d, $J=6.5\text{Hz}$), 1.09 (3H, d, $J=5.9\text{Hz}$), 1.2-1.5 (10H, m), 1.7-2.1 (5H, m), 2.2-2.5 (3H, m), 2.6-2.7 (1H, m),

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3.1-3.2 (1H, m), 3.6-4.5 (16H, m), 4.7-5.0 (3H, m),
5.0-5.2 (5H, m), 5.10 (1H, d, $J=3.1\text{Hz}$), 5.26 (1H,
d, $J=4.2\text{Hz}$), 5.56 (1H, d, $J=5.5\text{Hz}$), 6.73 (1H, d,
 $J=8.1\text{Hz}$), 6.8-7.0 (2H, m), 7.05 (1H, s), 7.1-7.5
5 (5H, m), 8.0-8.4 (8H, m), 8.85 (1H, s), 8.95 (1H, d,
 $J=7.0\text{Hz}$)

FAB-MASS : $m/z = 1357.3$ ($M+\text{Na}^+$)

Elemental Analysis Calcd. for $\text{C}_{58}\text{H}_{75}\text{N}_{10}\text{O}_{23}\text{NaS}\cdot 7\text{H}_2\text{O}$:

C 47.67, H 6.14, N 9.58

10 Found : C 47.63, H 6.42, N 9.52

Example 102

IR (KBr) : 3361, 1670, 1648, 1633, 1540, 1519,
1249 cm^{-1}

15 NMR ($\text{DMSO}-d_6$, δ) : 0.89 (3H, t, $J=7.0\text{Hz}$), 0.97 (3H, d,
 $J=6.8\text{Hz}$), 1.10 (3H, d, $J=5.7\text{Hz}$), 1.2-1.5 (6H, m),
1.6-2.4 (8H, m), 2.5-2.7 (1H, m), 3.1-3.3 (1H, m),
3.6-4.5 (16H, m), 4.80 (2H, d, $J=5.8\text{Hz}$), 4.8-5.2
(5H, m), 5.10 (1H, d, $J=5.4\text{Hz}$), 5.18 (1H, d,
20 $J=3.1\text{Hz}$), 5.25 (1H, d, $J=4.3\text{Hz}$), 5.55 (1H, d,
 $J=5.7\text{Hz}$), 6.73 (1H, d, $J=8.2\text{Hz}$), 6.8-7.0 (2H, m),
7.0-7.5 (6H, m), 8.02 (1H, d, $J=5.3\text{Hz}$), 8.0-8.4
(4H, m), 8.42 (2H, d, $J=8.4\text{Hz}$), 8.48 (2H, d,
 $J=8.9\text{Hz}$), 8.8-9.0 (3H, m)

25 FAB-MASS : $m/z = 1339.3$ ($M+\text{Na}^+$)

Elemental Analysis Calcd. for $\text{C}_{58}\text{H}_{73}\text{N}_{10}\text{O}_{22}\text{SNa}\cdot 6\text{H}_2\text{O}$:

C 48.87, H 6.01, N 9.83

Found : C 49.16, H 5.92, N 9.86

30 Example 103

IR (KBr) : 3350, 2971, 2859, 1672, 1629, 1537, 1442,
1247, 1047 cm^{-1}

35 NMR ($\text{DMSO}-d_6$, δ) : 0.96 (3H, d, $J=6.8\text{Hz}$), 1.0-1.2 (6H,
m), 1.2-1.6 (12H, m), 1.7-2.5 (8H, m), 2.5-2.6 (1H,
m), 3.2-3.6 (7H, m), 3.7-4.5 (16H, m), 4.76 (2H, d,

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J=5.6Hz), 4.8-5.1 (5H, m), 5.09 (1H, d, J=5.5Hz),
5.16 (1H, d, J=3.1Hz), 5.23 (1H, d, J=5.5Hz), 5.51
(1H, d, J=5.9Hz), 6.73 (1H, d, J=8.2Hz), 6.8-6.9
(2H, m), 7.0-7.1 (3H, m), 7.3-7.5 (3H, m), 7.67
5 (2H, d, J=6.9Hz), 7.71 (2H, d, J=6.9Hz), 7.95 (2H,
d, J=8.4Hz), 8.05 (1H, d, J=7.0Hz), 8.23 (1H, d,
J=7.7Hz), 8.70 (1H, d, J=7.0Hz), 8.84 (1H, s)

FAB-MASS : $m/z = 1377.1$ ($M+Na^+$)

10 Elemental Analysis Calcd. for $C_{60}H_{83}N_8O_{24}NaS \cdot 5H_2O$:
C 49.86, H 6.49, N 7.75
Found : C 49.74, H 6.73, N 7.68

Example 104

15 IR (KBr) : 3349, 2937, 2858, 1672, 1629, 1537, 1444,
1249, 1047 cm^{-1}

20 NMR (DMSO- d_6 , δ) : 0.96 (3H, d, J=6.7Hz), 1.08 (3H, d,
J=5.6Hz), 1.2-1.7 (14H, m), 1.7-2.1 (5H, m), 2.1-
2.4 (5H, m), 2.5-2.6 (1H, m), 3.1-3.2 (1H, m), 3.4-
3.6 (4H, m), 3.7-4.5 (16H, m), 4.77 (2H, d,
J=5.7Hz), 4.8-5.2 (5H, m), 5.09 (1H, d, J=5.6Hz),
5.16 (1H, d, J=3.1Hz), 5.24 (1H, d, J=4.5Hz), 5.51
(1H, d, J=5.8Hz), 6.73 (1H, d, J=8.2Hz), 6.8-6.9
(2H, m), 7.0-7.1 (3H, m), 7.3-7.5 (3H, m), 7.6-7.8
(4H, m), 7.96 (2H, d, J=8.4Hz), 8.10 (1H, d,
25 J=8.4Hz), 8.24 (1H, d, J=7.7Hz), 8.71 (1H, d,
J=7.0Hz), 8.89 (1H, s)

FAB-MASS : $m/z = 1386.5$ ($M+Na^+$)

30 Elemental Analysis Calcd. for $C_{61}H_{82}N_9O_{23}NaS \cdot 6H_2O$:
C 49.76, H 6.43, N 8.56
Found : C 49.99, H 6.39, N 8.52

Example 105

35 IR (KBr) : 3350, 2933, 2856, 1664, 1631, 1604, 1511,
1450, 1243, 1045 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.86 (3H, t, J=6.7Hz), 0.96 (3H, d,

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5 J=6.5Hz), 1.05 (3H, d, J=5.7Hz), 1.2-1.5 (8H, m),
1.6-2.0 (5H, m), 2.1-2.4 (3H, m), 2.5-2.6 (1H, m),
3.0-3.3 (5H, m), 3.6-4.4 (20H, m), 4.7-5.1 (7H, m),
5.10 (1H, d, J=5.5Hz), 5.16 (1H, d, J=3.1Hz), 5.27
(1H, d, J=4.5Hz), 5.51 (1H, d, J=6.0Hz), 6.7-7.1
(9H, m), 7.2-7.5 (3H, m), 8.0-8.2 (2H, m), 8.2-8.4
(1H, m), 8.4-8.6 (1H, m), 8.66 (1H, d, J=2.2Hz),
8.85 (1H, s)

FAB-MASS : $m/z = 1360$ ($M+Na^+$)

10 Elemental Analysis Calcd. for $C_{58}H_{80}N_{11}O_{22}SNa \cdot 6H_2O$:
C 48.16, H 6.41, N 10.65
Found : C 47.91, H 6.31, N 10.56

Example 106

15 IR (KBr) : 3369, 3345, 2935, 1672, 1629, 1511, 1245,
1047 cm^{-1}

20 NMR (DMSO- d_6 , δ) : 0.96 (3H, d, J=6.7Hz), 1.06 (3H, d,
J=5.8Hz), 1.3-1.6 (10H, m), 1.6-2.0 (5H, m), 2.1-
2.4 (3H, m), 2.5-2.6 (1H, m), 3.20 (3H, s), 3.28
(2H, t, J=6.4Hz), 3.1-3.4 (5H, m), 3.7-4.5 (20H,
m), 4.7-5.1 (7H, m), 5.08 (1H, d, J=5.5Hz), 5.15
(1H, d, J=3.1Hz), 5.23 (1H, d, J=4.5Hz), 5.48 (1H,
d, J=5.8Hz), 6.73 (1H, d, J=8.2Hz), 6.82 (2H, d,
J=9.1Hz), 6.94 (2H, d, J=9.1Hz), 6.9-7.0 (1H, m),
25 7.04 (1H, s), 7.3-7.5 (3H, m), 8.0-8.1 (2H, m),
8.27 (1H, d, J=7.7Hz), 8.49 (1H, d, J=7.0Hz), 8.66
(1H, d, J=2.2Hz), 8.84 (1H, s)

FAB-MASS : $m/z = 1404$ ($M+Na^+$)

30 Example 107

IR (KBr) : 3357, 1647, 1631, 1537, 1444, 1249,
1049 cm^{-1}

35 NMR (DMSO- d_6 , δ) : 0.9-1.1 (6H, m), 1.09 (3H, d,
J=5.9Hz), 1.6-2.4 (8H, m), 2.4-2.5 (1H, m), 3.1-3.3
(1H, m), 3.6-4.5 (16H, m), 4.8-5.2 (7H, m), 5.10

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(1H, d, J=5.6Hz), 5.17 (1H, d, J=3.1Hz), 5.25 (1H, d, J=4.5Hz), 5.55 (1H, d, J=5.9Hz), 6.73 (1H, d, J=8.2Hz), 6.8-7.0 (2H, m), 7.0-7.6 (6H, m), 7.73 (2H, d, J=8.7Hz), 7.86 (2H, d, J=8.5Hz), 8.0-8.3 (8H, m), 8.84 (1H, s), 8.9-9.0 (1H, m)

FAB-MASS : $m/z = 1379.4$ (M+Na)⁺

Elemental Analysis Calcd. for $C_{59}H_{69}N_{10}O_{22}S_2Na \cdot 6H_2O$:
C 48.36, H 5.57, N 9.56
Found : C 48.18, H 5.60, N 9.36

The Object Compounds (108) to (117) were obtained according to a similar manner to that of Example 27.

Example 108

IR (KBr) : 3350, 2933, 1670, 1627, 1521, 1436, 1272, 1047 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.85 (3H, t, J=6.7Hz), 0.92 (3H, d, J=6.7Hz), 1.1-1.4 (11H, m), 1.7-2.4 (9H, m), 3.1-3.2 (1H, m), 3.5-5.4 (27H, m), 6.6-7.2 (8H, m), 7.5-7.8 (3H, m), 7.8-8.0 (3H, m), 8.1-8.8 (3H, m)

FAB-MASS : $m/z = 1249.4$ (M+Na)⁺

Elemental Analysis Calcd. for $C_{52}H_{71}N_{10}O_{21}NaS \cdot 7H_2O$:
C 46.15, H 6.33, N 10.35
Found : C 46.12, H 6.35, N 10.24

Example 109

IR (Kbr pelet) : 3361, 2933, 2856, 1670, 1652, 1616, 1540, 1508, 1448, 1261, 1047 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.86 (3H, t, J=6.6Hz), 0.97 (3H, d, J=6.8Hz), 1.12 (3H, d, J=6.8Hz), 1.2-1.5 (10H, m), 1.7-2.0 (5H, m), 2.2-2.6 (4H, m), 3.1-3.2 (1H, m), 3.7-4.4 (16H, m), 4.8-5.3 (10H, m), 5.59 (1H, d, J=6.0Hz), 6.7-6.9 (3H, m), 7.0-7.4 (7H, m), 7.8-8.2 (4H, m), 8.8-9.0 (2H, m)

FAB-MASS : $m/z = 1280.3$ (M+Na)⁺

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Elemental Analysis Calcd. for $C_{54}H_{72}N_9O_{23}NaS \cdot 7H_2O$:

C 46.45, H 6.21, N 9.03

Found : C 46.68, H 6.44, N 9.03

5 Example 110IR (KBr) : 3350, 2931, 1670, 1627, 1540, 1436, 1276,
1047 cm^{-1}

10 NMR (DMSO- d_6 , δ) : 0.87 (3H, t, $J=6.8Hz$), 0.93 (2H, d,
 $J=8.8Hz$), 1.08 (2H, d, $J=5.9Hz$), 1.2-1.4 (4H, m),
1.5-1.7 (2H, m), 1.7-2.1 (3H, m), 2.1-2.4 (3H, m),
2.6-2.7 (3H, m), 3.1-3.3 (1H, m), 3.6-4.5 (17H, m),
4.7-5.4 (8H, m), 6.73 (1H, d, $J=8.2Hz$), 6.83 (2H,
d, $J=8.2Hz$), 7.0-7.1 (1H, m), 7.2-7.5 (5H, m), 7.65
15 (2H, d, $J=8.2Hz$), 7.74 (2H, d, $J=8.4Hz$), 7.98 (2H,
d, $J=8.4Hz$), 8.08 (1H, d, $J=8.5Hz$), 8.25 (1H, d,
 $J=8.5Hz$), 8.74 (1H, d, $J=7.6Hz$), 8.7-9.0 (1H, br)

FAB-MASS : $m/z = 1231.2$ ($M+Na^+$)Elemental Analysis Calcd. for $C_{53}H_{69}N_8O_{21}NaS \cdot 3H_2O$:

C 50.39, H 5.98, N 8.87

20 Found : C 50.34, H 6.25, N 8.90

Example 111IR (KBr) : 3353.6, 1670.1, 1652.7, 1623.8 cm^{-1}

25 NMR (DMSO- d_6 , δ) : 0.96 (3H, d, $J=6.7Hz$), 1.07 (3H, d,
 $J=5.6Hz$), 1.20-1.62 (8H, m), 1.62-2.00 (5H, m),
2.10-2.65 (4H, m), 3.20 (3H, s), 3.08-3.40 (1H, m),
3.30 (2H, t, $J=6.5Hz$), 3.53-4.50 (15H, m), 4.68-
5.13 (9H, m), 5.16 (1H, d, $J=2.9Hz$), 5.26 (1H, d,
 $J=4.5Hz$), 5.53 (1H, d, $J=5.9Hz$), 6.68-6.95 (4H, m),
30 6.95-7.11 (3H, m), 7.20-7.52 (3H, m), 7.55-7.95
(7H, m), 8.13 (1H, d, $J=8.4Hz$), 8.31 (1H, d,
 $J=7.7Hz$), 8.53 (1H, d, $J=7.0Hz$), 8.85 (1H, s)

FAB-MASS : $m/z = 1331.5$ ($M+Na-1$)Elemental Analysis Calcd. for $C_{58}H_{77}N_8NaO_{23}S \cdot 6H_2O$:

35 C 49.15, H 6.33, N 7.91

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Found : C 49.07, H 6.53, N 7.84

Example 112

5 IR (KBr) : 3350, 2937, 1673, 1646, 1631, 1538, 1519,
1456, 1247, 1049 cm^{-1}

10 NMR (DMSO- d_6 , δ) : 0.97 (3H, d, $J=6.6\text{Hz}$), 1.07 (3H, d, $J=5.7\text{Hz}$), 1.3-2.4 (25H, m), 2.5-2.6 (1H, m), 3.2-3.4 (1H, m), 3.5-4.6 (20H, m), 4.8-5.7 (11H, m), 6.73 (1H, d, $J=8.0\text{Hz}$), 6.9-7.0 (2H, m), 7.0-7.2 (3H, m), 7.3-7.6 (3H, m), 7.74 (2H, d, $J=8.5\text{Hz}$), 7.77 (2H, d, $J=8.3\text{Hz}$), 8.02 (2H, d, $J=8.3\text{Hz}$), 8.13 (1H, d, $J=8.4\text{Hz}$), 8.30 (1H, d, $J=7.7\text{Hz}$), 8.77 (1H, d, $J=7.0\text{Hz}$), 8.85 (1H, s)

FAB-MASS : $m/z = 1389$ ($M+\text{Na}^+$)

15 Elemental Analysis Calcd. for $\text{C}_{61}\text{H}_{83}\text{N}_8\text{O}_{24}\text{NaS}\cdot 7\text{H}_2\text{O}$:

C 49.06, H 6.55, N 7.50

Found : C 49.03, H 6.54, N 7.56

Example 113

20 NMR (DMSO- d_6 , δ) : 0.84 (3H, t, $J=6.7\text{Hz}$), 0.96 (3H, d, $J=6.7\text{Hz}$), 1.07 (3H, d, $J=5.9\text{Hz}$), 1.1-1.3 (14H, m), 1.7-2.1 (5H, m), 2.2-2.5 (3H, m), 2.6-2.7 (1H, m), 3.1-3.3 (1H, m), 3.7-4.5 (16H, m), 4.7-5.1 (7H, m), 5.10 (1H, d, $J=5.5\text{Hz}$), 5.16 (1H, d, $J=3.1\text{Hz}$), 5.25 (1H, d, $J=4.5\text{Hz}$), 5.49 (1H, d, $J=5.7\text{Hz}$), 6.53 (1H, d, $J=3.1\text{Hz}$), 6.73 (1H, d, $J=8.2\text{Hz}$), 6.8-6.9 (2H, m), 7.05 (1H, m), 7.31 (1H, d, $J=8.1\text{Hz}$), 7.4-7.6 (4H, m), 7.70 (1H, d, $J=6.7\text{Hz}$), 8.08 (1H, d, $J=8.4\text{Hz}$), 8.18 (1H, s), 8.31 (1H, d, $J=7.7\text{Hz}$), 8.57 (1H, d, $J=7.0\text{Hz}$), 8.85 (1H, s)

FAB-MASS : $m/z = 1264$ ($M+\text{Na}^+$)Elemental Analysis Calcd. for $\text{C}_{54}\text{H}_{76}\text{N}_9\text{O}_{21}\text{NaS}\cdot 6\text{H}_2\text{O}$:

C 48.03, H 6.57, N 9.34

Found : C 48.02, H 6.61, N 9.28

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Example 114IR (KBr) : 3350, 2937, 1668, 1631, 1537, 1247, 1047 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.85 (3H, t, $J=7.4\text{Hz}$), 0.96 (3H, d, $J=6.5\text{Hz}$), 1.07 (3H, d, $J=5.7\text{Hz}$), 1.3-1.7 (7H, m), 1.7-2.1 (5H, m), 2.2-2.4 (3H, m), 2.6-2.7 (1H, m), 3.0-3.8 (16H, m), 3.8-4.6 (11H, m), 4.7-5.3 (6H, m), 6.73 (1H, d, $J=8.2\text{Hz}$), 6.8-7.0 (2H, m), 7.0-7.2 (3H, m), 7.3-7.5 (3H, m), 7.6-7.8 (4H, m), 7.96 (2H, d, $J=8.3\text{Hz}$), 8.11 (1H, d, $J=8.2\text{Hz}$), 8.26 (1H, d, $J=7.6\text{Hz}$), 8.6-9.0 (2H, m)

FAB-MASS : $m/z = 1319.4$ ($M+\text{Na}^+$)Elemental Analysis Calcd. for $\text{C}_{57}\text{H}_{77}\text{N}_8\text{O}_{23}\text{NaS}\cdot 8\text{H}_2\text{O}$:

C 47.50, H 6.50, N 7.77

Found : C 47.72, H 6.85, N 7.85

Example 115IR (KBr) : 3350, 1666, 1631, 1546, 1276, 1247 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.97 (3H, d, $J=7.5\text{Hz}$), 1.08 (3H, d, $J=5.7\text{Hz}$), 1.4-1.6 (4H, m), 1.6-2.1 (5H, m), 2.1-2.4 (3H, m), 2.5-2.6 (1H, m), 3.1-3.3 (1H, m), 3.23 (3H, s), 3.3-3.5 (2H, m), 3.7-4.5 (16H, m), 4.79 (2H, d, $J=6.2\text{Hz}$), 4.8-5.1 (5H, m), 5.11 (1H, d, $J=5.6\text{Hz}$), 5.18 (1H, d, $J=3.1\text{Hz}$), 5.26 (1H, d, $J=4.4\text{Hz}$), 5.54 (1H, d, $J=5.7\text{Hz}$), 6.73 (1H, d, $J=8.1\text{Hz}$), 6.8-7.0 (2H, m), 7.0-7.1 (3H, m), 7.3-7.5 (3H, m), 7.6-7.9 (8H, m), 8.01 (2H, d, $J=8.4\text{Hz}$), 8.08 (1H, d, $J=8.4\text{Hz}$), 8.32 (1H, d, $J=7.7\text{Hz}$), 8.80 (1H, d, $J=7.0\text{Hz}$), 8.85 (1H, s)

FAB-MASS : $m/z = 1353.9$ ($M+\text{Na}^+$)Elemental Analysis Calcd. for $\text{C}_{60}\text{H}_{75}\text{N}_8\text{O}_{23}\text{NaS}\cdot 9.5\text{H}_2\text{O}$:

C 47.96, H 6.31, N 7.46

Found : C 47.97, H 6.25, N 7.41

Example 116

IR (KBr) : 3450, 2935, 1675, 1650, 1540, 1513, 1454,

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1047 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.97 (3H, d, $J=6.7\text{Hz}$), 1.09 (3H, d, $J=5.9\text{Hz}$), 1.60 (6H, s), 1.7-2.4 (6H, m), 2.5-2.6 (1H, m), 3.1-3.6 (5H, m), 3.7-4.5 (14H, m), 4.7-5.0 (3H, m), 5.0-5.2 (4H, m), 5.11 (1H, d, $J=5.5\text{Hz}$), 5.18 (1H, d, $J=3.1\text{Hz}$), 5.26 (1H, d, $J=4.5\text{Hz}$), 5.56 (1H, d, $J=6.0\text{Hz}$), 6.8-7.5 (9H, m), 7.84 (2H, d, $J=8.8\text{Hz}$), 8.0-8.4 (6H, m), 8.85 (1H, s), 8.91 (1H, d, $J=7.0\text{Hz}$)

10 FAB-MASS : $m/z = 1328$ ($M+\text{Na}$)⁺

Elemental Analysis Calcd. for $\text{C}_{55}\text{H}_{68}\text{N}_{11}\text{O}_{21}\text{S}_2\text{Na}\cdot 8\text{H}_2\text{O}$:
C 45.55, H 5.84, N 10.62
Found : C 45.62, H 5.70, N 10.54

15 Example 117

IR (KBr) : 3350, 2939, 1664, 1627, 1531, 1446, 1249,
1049 cm^{-1}

20 NMR (DMSO- d_6 , δ) : 0.8-1.0 (6H, m), 1.4-1.9 (9H, m),
2.0-2.5 (4H, m), 3.1-3.2 (1H, m), 3.22 (3H, s),
3.3-3.4 (2H, m), 3.51 (2H, s), 3.6-4.4 (16H, m),
4.7-5.2 (7H, m), 5.07 (1H, d, $J=5.6\text{Hz}$), 5.17 (1H,
d, $J=3.1\text{Hz}$), 5.23 (1H, d, $J=4.5\text{Hz}$), 5.54 (1H, d,
 $J=5.9\text{Hz}$), 6.7-6.8 (3H, m), 7.0-7.4 (8H, m), 7.5-7.7
(4H, m), 7.70 (4H, s), 8.1-8.2 (2H, m), 8.51 (1H,
25 d, $J=7.0\text{Hz}$), 8.83 (1H, s)

FAB-MASS : $m/z = 1367.6$ ($M+\text{Na}^+$)

Elemental Analysis Calcd. for $\text{C}_{61}\text{H}_{77}\text{N}_8\text{O}_{23}\text{SNa}\cdot 6.5\text{H}_2\text{O}$:
C 50.01, H 6.20, N 7.66
Found : C 50.30, H 6.50, N 7.75

30 Example 118

To a solution of The Object Compound (61) (0.25 g) in methanol (50 ml) was added dry 10% palladium on carbon (0.2 g) and stirred for 6 hours under hydrogen atmosphere. The
35 palladium on carbon was filtered off, and the filtrate was

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evaporated under reduced pressure to give Object Compound 118 (179 mg).

IR (KBr) : 3400, 1668.1, 1627.6 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.92 (3H, d, $J=6.7\text{Hz}$), 1.1-2.45
5 (40H, m), 3.20 (3H, s), 3.28 (2H, t, $J=6.5\text{Hz}$), 3.0-
3.4 (1H, m), 3.5-4.7 (14H, m), 4.95-5.5 (12H, m),
6.55 (1H, d, $J=8.4\text{Hz}$), 6.84 (1H, s), 6.86 (1H, d,
 $J=8.4\text{Hz}$), 7.0-7.3 (4H, m), 7.9-8.3 (4H, m)

FAB-MASS : $m/z = 1292$ (M+Na)

10 Elemental Analysis Calcd. for $\text{C}_{54}\text{H}_{88}\text{N}_9\text{O}_{22}\text{SNa}\cdot 5\text{H}_2\text{O}$:

C 47.67, H 7.26, N 9.26

Found : C 47.72, H 7.35, N 8.95

15 The Object Compounds (119) to (121) were obtained
according to a similar manner to that of Example 118.

Example 119

NMR (DMSO- d_6 , δ) : 0.87 (3H, t, $J=6.6\text{Hz}$), 1.00 (3H, d,
 $J=7.3\text{Hz}$), 1.03 (3H, d, $J=6.0\text{Hz}$), 1.2-1.5 (4H, m),
20 1.5-2.0 (5H, m), 2.1-2.7 (8H, m), 3.17 (1H, m),
3.6-4.5 (14H, m), 4.65-5.7 (12H, m), 6.72 (1H, d,
 $J=8.1\text{Hz}$), 6.75 (1H, s), 6.80 (1H, d, $J=8.1\text{Hz}$), 7.05
(1H, s), 7.1-7.7 (15H, m), 8.0-8.6 (4H, m), 8.85
(1H, s)

25 FAB-MASS : $m/z = 1274$ (M+Na)

Elemental Analysis Calcd. for $\text{C}_{55}\text{H}_{74}\text{N}_9\text{O}_{21}\text{SNa}\cdot 7\text{H}_2\text{O}$:

C 47.93, N 6.43, N 9.15

Found : C 48.12, N 6.56, N 9.03

30 Example 120

IR (KBr) : 3355.5, 1672.0 1629.6 cm^{-1}

NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.6\text{Hz}$), 0.98 (3H, d,
 $J=6.5\text{Hz}$), 1.03 (3H, d, $J=6.0\text{Hz}$), 1.2-2.6 (21H, m),
3.18 (1H, m), 3.6-4.5 (16H, m), 4.65-5.55 (12H, m),
35 6.6-7.5 (10H, m), 8.0-8.6 (4H, m), 8.89 (1H, s)

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FAB-MASS : $m/z = 1256$ (M+Na)Example 121IR (KBr) : 3357.5, 1660.4, 1629.6, 1249.6 cm^{-1}

5 NMR (DMSO- d_6 , δ) : 0.86 (3H, t, $J=6.6\text{Hz}$), 0.96 (3H, d, $J=6.8\text{Hz}$), 1.03 (3H, d, $J=6.0\text{Hz}$), 1.1-1.5 (12H, m), 1.6-2.0 (5H, m), 2.0-2.5 (4H, m), 3.07 (1H, m), 3.5-4.5 (16H, m), 4.6-5.6 (12H, m), 6.72 (1H, d, $J=8.1\text{Hz}$), 6.7-6.9 (4H, m), 7.04 (1H, s), 7.16 (1H, s),
10 s), 7.1-7.5 (2H, m), 7.25 (2H, d, $J=8.6\text{Hz}$), 8.0-8.2 (3H, m), 8.46 (1H, d, $J=7\text{Hz}$), 8.84 (1H, s)

FAB-MASS : $m/z = 1256$ (M+Na)Elemental Analysis Calcd. for $\text{C}_{52}\text{H}_{76}\text{N}_9\text{O}_{22}\text{SNa}\cdot 7\text{H}_2\text{O}$:

15 C 45.91, H 6.67, N 9.27
Found : C 45.98, H 6.67, N 9.10

Example 122

20 A solution of Object Compound (11) (795 mg) in water (16 ml) was left for 240 hours. The solution was subjected to column chromatography on ODS (YMC-gel ODS-AMS50) and eluted with 25% $\text{CH}_3\text{CN}/\text{H}_2\text{O}$. The fractions containing Object Compound were combined and the acetonitrile was removed under reduced pressure. The residue was lyophilized to give Object Compound (123) (38 mg).

25 IR (KBr) : 3361, 2956, 2875, 1668, 1627, 1521, 1249, 1047 cm^{-1}

30 NMR (DMSO- d_6 , δ) : 0.8-1.5 (19H, m), 1.6-2.4 (13H, m), 3.1-3.2 (1H, m), 3.5-4.1 (12H, m), 4.1-4.7 (10H, m), 4.9-5.6 (5H, m), 5.98 (1H, d, $J=10.6\text{Hz}$), 6.36 (1H, d, $J=10.6\text{Hz}$), 6.7-7.3 (12H, m), 7.4-8.0 (7H, m)

FAB-MASS : $m/z = 1273.1$ (M+Na⁺)Elemental Analysis Calcd. for $\text{C}_{55}\text{H}_{71}\text{N}_8\text{O}_{22}\text{NaS}\cdot 11\text{H}_2\text{O}$:

35 C 45.58, H 6.47, N 7.73
Found : C 45.83, H 6.26, N 7.75

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The Object Compound (123) was obtained according to a similar manner to that of Example 118.

Example 123

5 IR (KBr) : 3349.7, 1670.1, 1627.6 cm^{-1}
NMR (DMSO- d_6 , δ) : 0.87 (3H, t, $J=7.2\text{Hz}$), 0.96 (3H, d, $J=6.7\text{Hz}$), 1.13 (3H, d, $J=5.7\text{Hz}$), 1.18-1.55 (10H, m), 1.58-2.08 (5H, m), 2.08-2.90 (4H, m), 2.90-3.30 (2H, m), 3.60-4.50 (17H, m), 4.70-5.70 (12H, m),
10 6.65-7.60 (11H, m), 7.80 (2H, br s), 7.95-8.23 (2H, m), 8.75 (1H, d, $J=7.0\text{Hz}$), 8.85 (1H, s)
FAB-MASS : $m/z = 1114.4$ (M- SO_4-2)
Elemental Analysis Calcd. for $\text{C}_{52}\text{H}_{77}\text{N}_9\text{O}_{21}\text{S}\cdot 6\text{H}_2\text{O}$:
C 47.88, H 6.88, N 9.66
15 Found : C 47.60, H 6.74, N 9.53

The following compound (124) was obtained according to a similar manner to that of Example 1.

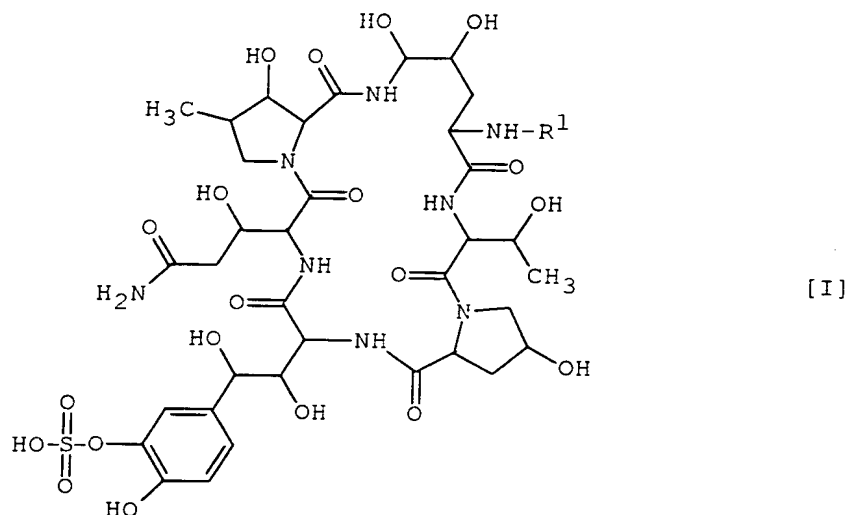
20 Example 124

IR (KBr) : 3324, 2937, 2873, 1664, 1629, 1442,
1257 cm^{-1}
NMR (DMSO- d_6 , δ) : 0.91 (3H, t, $J=7.1\text{Hz}$), 0.96 (3H, d, $J=6.7\text{Hz}$), 1.09 (3H, d, $J=5.7\text{Hz}$), 1.3-1.5 (4H, m),
25 1.7-2.6 (9H, m), 3.1-3.3 (1H, m), 3.7-4.6 (16H, m), 4.7-5.1 (7H, m), 5.11 (1H, d, $J=5.6\text{Hz}$), 5.17 (1H, d, $J=3.1\text{Hz}$), 5.26 (1H, d, $J=4.5\text{Hz}$), 5.55 (1H, d, $J=5.8\text{Hz}$), 6.7-6.9 (3H, m), 7.0-7.6 (6H, m), 7.97 (2H, d, $J=8.8\text{Hz}$), 8.0-8.4 (6H, m), 8.85 (1H, s),
30 8.92 (1H, d, $J=7.0\text{Hz}$)
FAB-MASS : $m/z = 1331$ (M+ Na^+)
Elemental Analysis Calcd. for $\text{C}_{55}\text{H}_{69}\text{N}_{10}\text{O}_{22}\text{NaS}_2$:
C 45.45, H 5.89, N 9.64
Found : C 45.71, H 5.68, N 9.60

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CLAIMS

1. A polypeptide compound of the following general formula :



20 wherein R¹ is lower alkanoyl substituted with
unsaturated 6-membered heteromonocyclic
group containing at least one nitrogen
atom which may have one or more
suitable substituent(s);

25 lower alkanoyl substituted with
1,2,3,4-tetrahydroisoquinoline which
may have one or more suitable
substituent(s);

30 lower alkanoyl substituted with
unsaturated condensed heterocyclic
group containing at least one oxygen
atom which may have one or more
suitable substituent(s);

35 lower alkanoyl substituted with
unsaturated condensed heterocyclic
group containing 1 to 3 sulfur atom(s)

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which may have one or more suitable
substituent(s);

5

lower alkanoyl substituted with
unsaturated condensed heterocyclic
group containing 2 or more nitrogen
atom(s) which may have one or more
suitable substituent(s);

10

lower alkanoyl substituted with
saturated 3 to 8 membered
heteromonocyclic group containing at
least one nitrogen atom which may have
one or more suitable substituent(s);

15

ar(lower)alkenoyl substituted with
aryl which may have one or more
suitable substituent(s);

naphthyl(lower)alkenoyl which may
have one or more higher alkoxy;

20

lower alkynoyl which may have one or
more suitable substituent(s);

(C₂-C₆)alkanoyl substituted with
naphthyl having higher alkoxy;

25

ar(C₂-C₆)alkanoyl substituted with
aryl having one or more suitable
substituent(s), in which ar(C₂-C₆)-
alkanoyl may have one or more suitable
substituent(s);

30

aroyl substituted with heterocyclic
group which may have one or more
suitable substituent(s), in which aroyl
may have one or more suitable
substituent(s);

35

aroyl substituted with aryl having
heterocyclic(higher)alkoxy, in which
heterocyclic group may have one or more
suitable substituent(s);

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aroyle substituted with aryle having
lower alkoxy(higher)alkoxy;

aroyle substituted with aryle having
lower alkenyl(lower)alkoxy;

5 aroyle substituted with 2 lower
alkoxy;

aroyle substituted with aryle having
lower alkyl;

10 aroyle substituted with aryle having
higher alkyl;

aryloxy(lower)alkanoyl which may have
one or more suitable substituent(s);

15 ar(lower)alkoxy(lower)alkanoyl which
may have one or more suitable
substituent(s);

arylamino(lower)alkanoyl which may
have one or more suitable
substituent(s);

20 lower alkanoyl substituted with
pyrazolyl which has lower alkyl and
aryle having higher alkoxy;

lower alkoxy(higher)alkanoyl, in
which higher alkanoyl may have one or
more suitable substituent(s);

25 aroyle substituted with aryle having
heterocyclicoxy, in which
heterocyclicoxy may have one or more
suitable substituent(s);

30 aroyle substituted with
cyclo(lower)alkyl having lower alkyl;
indolylcarbonyl having higher alkyl;
naphthoyl having lower alkyl;
naphthoyl having higher alkyl;
naphthoyl having lower
35 alkoxy(higher)alkoxy;

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aryl substituted with aryl having
lower alkoxy(lower)alkoxy(higher)-
alkoxy;

5

aryl substituted with aryl having
lower alkoxy(lower)alkoxy;

aryl substituted with aryl which has
aryl having lower alkoxy;

aryl substituted with aryl which has
aryl having lower alkoxy(lower)alkoxy;

10

aryl substituted with aryl having
heterocyclicoxy(higher)alkoxy;

aryl substituted with aryl having
aryloxy(lower)alkoxy;

15

aryl substituted with aryl having
heterocycliccarbonyl(higher)alkoxy;

lower alkanoyl substituted with
oxazolyl which has aryl having higher
alkoxy;

20

lower alkanoyl substituted with furyl
which has aryl substituted with aryl
having lower alkoxy;

lower alkanoyl substituted with
triazolyl which has oxo and aryl having
higher alkyl;

25

higher alkanoyl having hydroxy;

higher alkanoyl having ar(lower)alkyl
and hydroxy;

3-methyl-tridecenoyl; or

30

(C₂-C₆)alkanoyl substituted with aryl
having higher alkoxy, in which (C₂-C₆)-
alkanoyl may have amino or protected
amino, and

a pharmaceutically acceptable salt thereof.

35

2. A compound of claim 1, wherein

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R¹ is lower alkanoyl substituted with unsaturated
6-membered heteromonocyclic group containing at
least one nitrogen atom which may have 1 to 3
substituent(s) selected from the group consisting
of lower alkoxy, higher alkoxy, lower alkyl,
higher alkyl, higher alkoxy(lower)alkyl, phenyl
having lower alkoxy, phenyl having higher alkoxy,
naphthyl having lower alkoxy, naphthyl having
higher alkoxy, phenyl having lower alkyl, phenyl
having higher alkyl, naphthoyl having higher
alkoxy, phenyl substituted with phenyl having
lower alkyl, 3 to 8-membered saturated
heteromonocyclic group containing at least one
nitrogen atom which may have phenyl having higher
alkoxy, phenyl substituted with phenyl having
lower alkoxy, 3 to 8-membered saturated
heteromonocyclic group containing at least one
nitrogen atom which may have phenyl having lower
alkoxy(higher)alkoxy, 3 to 8-membered saturated
heteromonocyclic group containing at least one
nitrogen atom which may have phenyl having lower
alkoxy, and oxo;

lower alkanoyl substituted with 1,2,3,4-
tetrahydroisoquinoline having higher alkoxy and
lower alkoxy carbonyl;

lower alkanoyl substituted with unsaturated
condensed heterocyclic group containing at least
one oxygen atom which may have 1 to 3
substituent(s) selected from the group consisting
of lower alkoxy, higher alkoxy, lower alkyl,
higher alkyl, higher alkoxy(lower)alkyl, phenyl
having lower alkoxy, phenyl having higher alkoxy,

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naphthyl having lower alkoxy, naphthyl having higher alkoxy, phenyl having lower alkyl, phenyl having higher alkyl, naphthoyl having higher alkoxy, phenyl substituted with phenyl having lower alkyl, unsaturated 6-membered heteromonocyclic group containing at least one nitrogen atom which may have higher alkoxy, and oxo;

lower alkanoyl substituted with unsaturated condensed heterocyclic group containing 1 to 3 sulfur atom(s) which may have 1 to 3 substituent(s) selected from the group consisting of lower alkoxy, higher alkoxy, lower alkyl, higher alkyl, higher alkoxy(lower)alkyl, phenyl having lower alkoxy, phenyl having higher alkoxy, naphthyl having lower alkoxy, naphthyl having higher alkoxy, phenyl having lower alkyl, phenyl having higher alkyl, naphthoyl having higher alkoxy, phenyl substituted with phenyl having lower alkyl, and oxo;

lower alkanoyl substituted with unsaturated condensed heterocyclic group containing 2 or more nitrogen atoms which may have 1 to 3 substituent(s) selected from the group containing of lower alkoxy, higher alkoxy, lower alkyl, higher alkyl, higher alkoxy(lower)alkyl, phenyl having lower alkoxy, phenyl having higher alkoxy, naphthyl having lower alkoxy, naphthyl having higher alkoxy, phenyl having lower alkyl, phenyl having higher alkyl, naphthoyl having higher alkoxy, phenyl substituted with phenyl having lower alkyl, and oxo; or

lower alkanoyl substituted with saturated 3 to 8-membered heteromonocyclic group containing at least one nitrogen atom which may have 1 to 3

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substituent(s) selected from the group consisting of lower alkoxy, higher alkoxy, lower alkyl, higher alkyl, higher alkoxy(lower)alkyl, phenyl having lower alkoxy, phenyl having higher alkoxy, naphthyl having lower alkoxy, naphthyl having higher alkoxy, phenyl having lower alkyl, phenyl having higher alkyl, naphthoyl having higher alkoxy, phenyl substituted with phenyl having lower alkyl, and oxo.

3. A compound of claim 1, wherein

R^1 is ar(lower)alkenoyl substituted with aryl which may have 1 to 3 substituent(s) selected from the group consisting of lower alkoxy, higher alkoxy, lower alkyl, higher alkyl, higher alkoxy(lower)alkyl, phenyl having lower alkoxy, phenyl having higher alkoxy, naphthyl having lower alkoxy, naphthyl having higher alkoxy, phenyl having lower alkyl, phenyl having higher alkyl, naphthoyl having higher alkoxy, phenyl substituted with phenyl having lower alkyl, lower alkoxy(lower)alkyl, halo(lower)alkoxy, lower alkenyloxy, halo(higher)alkoxy, lower alkoxy(higher)alkoxy, and oxo;

naphthyl(lower)alkenoyl which may have 1 to 3 higher alkoxy;

lower alkynoyl which may have 1 to 3 substituent(s) selected from the group consisting of lower alkoxy, higher alkoxy, lower alkyl, higher alkyl, higher alkoxy(lower)alkyl, phenyl having lower alkoxy, phenyl having higher alkoxy, naphthyl having lower alkoxy, naphthyl having higher alkoxy, phenyl having lower alkyl, phenyl having higher alkyl, naphthoyl having higher alkoxy, phenyl substituted with phenyl having

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lower alkyl, and oxo;

ar(C₂-C₆)alkanoyl substituted with aryl having 1 to 3 substituent(s) selected from the group consisting of lower alkoxy, higher alkoxy, lower alkyl, higher alkyl, higher alkoxy(lower)alkyl, phenyl having lower alkoxy, phenyl having higher alkoxy, naphthyl having lower alkoxy, naphthyl having higher alkoxy, phenyl having lower alkyl, phenyl having higher alkyl, naphthoyl having higher alkoxy, phenyl substituted with phenyl having lower alkyl, phenyl having lower alkoxy(lower)alkoxy, and oxo, in which ar(C₂-C₆)-alkanoyl may have hydroxy, oxo, protected amino or amino; or

(C₂-C₆)alkanoyl substituted with naphthyl having higher alkoxy.

4. A compound of claim 1, wherein

R¹ is aroyl substituted with heterocyclic group which may have 1 to 3 substituent(s) selected from the group consisting of lower alkoxy, higher alkoxy, lower alkyl, higher alkyl, higher alkoxy(lower)alkyl, phenyl having lower alkoxy, phenyl having higher alkoxy, naphthyl having lower alkoxy, naphthyl having higher alkoxy, phenyl having lower alkyl, phenyl having higher alkyl, naphthoyl having higher alkoxy, phenyl substituted with phenyl having lower alkyl, phenyl having lower alkoxy(higher)alkoxy, phenyl having higher alkenyloxy, heterocyclic group substituted with phenyl having lower alkoxy, heterocyclic group, cyclo(lower)alkyl having phenyl, phenyl having cyclo(lower)alkyl, phenyl substituted with heterocyclic group having lower alkyl and oxo, cyclo(lower)alkyl having lower alkyl, phenyl

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substituted with phenyl having lower alkoxy,
phenyl having heterocyclic group and oxo, in which
aroyl may have halogen;

5 aroyl substituted with aryl having
heterocyclic(higher)alkoxy, in which heterocyclic
group may have lower alkyl;

aroyl substituted with aryl having lower
alkoxy(higher)alkoxy;

10 aroyl substituted with aryl having lower
alkenyl(lower)alkoxy;

aroyl substituted with 2 lower alkoxy;

aroyl substituted with aryl having lower alkyl;
or

15 aroyl substituted with aryl having higher alkyl.

5. A compound of claim 1, wherein

R^1 is aryloxy(lower)alkanoyl which may have 1 to 3
substituent(s) selected from the group consisting
of lower alkoxy, higher alkoxy, lower alkyl,
20 higher alkyl, higher alkoxy(lower)alkyl, phenyl
having lower alkoxy, phenyl having higher alkoxy,
naphthyl having lower alkoxy, naphthyl having
higher alkoxy, phenyl having lower alkyl, phenyl
having higher alkyl, naphthoyl having higher
25 alkoxy, phenyl substituted with phenyl having
lower alkyl, and oxo;

ar(lower)alkoxy(lower)alkanoyl which may have 1
to 3 substituent(s) selected from the group
consisting of lower alkoxy, higher alkoxy, lower
30 alkyl, higher alkyl, higher alkoxy(lower)alkyl,
phenyl having lower alkoxy, phenyl having higher
alkoxy, naphthyl having lower alkoxy, naphthyl
having higher alkoxy, phenyl having lower alkyl,
phenyl having higher alkyl, naphthoyl having
35 higher alkoxy, phenyl substituted with phenyl

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having lower alkyl, and oxo; or

arylamino(lower)alkanoyl which may have 1 to 3
substituent(s) selected from the group consisting
of lower alkoxy, higher alkoxy, lower alkyl,
higher alkyl, higher alkoxy(lower)alkyl, phenyl
having lower alkoxy, phenyl having higher alkoxy,
naphthyl having lower alkoxy, naphthyl having
higher alkoxy, phenyl having lower alkyl, phenyl
having higher alkyl, naphthoyl having higher
alkoxy, phenyl substituted with phenyl having
lower alkyl, and oxo.

6. A compound of claim 1, wherein

R^1 is lower alkanoyl substituted with pyrazolyl which

has lower alkyl and aryl having higher alkoxy;

lower alkoxy(higher)alkanoyl, in which higher
alkanoyl may have amino or protected amino;

aroyl substituted with aryl having
heterocyclicoxy, in which heterocyclicoxy may have
phenyl;

aroyl substituted with cyclo(lower)alkyl having
lower alkyl;

indolylcarbonyl having higher alkyl;

naphthoyl having lower alkyl;

naphthoyl having higher alkyl;

naphthoyl having lower alkoxy(higher)alkoxy;

aroyl substituted with aryl having lower
alkoxy(lower)alkoxy(higher)alkoxy;

aroyl substituted with aryl having lower
alkoxy(lower)alkoxy;

aroyl substituted with aryl which has phenyl
having lower alkoxy;

aroyl substituted with aryl which has phenyl
having lower alkoxy(lower)alkoxy;

aroyl substituted with aryl having

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heterocyclicoxy(higher)alkoxy;

aroyl substituted with aryl having
phenoxy(lower)alkoxy;

5 aroyl substituted with aryl having
heterocycliccarbonyl(higher)alkoxy;

lower alkanoyl substituted with oxazolyl which
has aryl having higher alkoxy;

lower alkanoyl substituted with furyl which has
aryl substituted with phenyl having lower alkoxy;

10 lower alkanoyl substituted with triazolyl which
has oxo and phenyl having higher alkyl;

higher alkanoyl having hydroxy;

higher alkanoyl having benzyl and hydroxy;

3-methyl-tridecenoyl; or

15 (C₂-C₆)alkanoyl substituted with aryl having
higher alkoxy, in which (C₂-C₆)alkanoyl may have
amino or protected amino.

7. A compound of claim 2, wherein

20 R¹ is lower alkanoyl substituted with pyridyl or
pyridazinyl, each of which may have 1 to 3
substituent(s) selected from the group consisting
of higher alkoxy, higher alkoxy(lower)alkyl,
phenyl having higher alkoxy, phenyl substituted
25 with phenyl having lower alkoxy, piperazinyl
substituted with phenyl having higher alkoxy,
piperazinyl substituted with phenyl having lower
alkoxy(higher)alkoxy, and piperazinyl substituted
with phenyl having lower alkoxy;

30 lower alkanoyl substituted with 1,2,3,4-
tetrahydroisoquinoline having higher alkoxy and
lower alkoxy carbonyl;

lower alkanoyl substituted with coumarin which
may have 1 to 3 substituent(s) selected from the
35 group consisting of higher alkoxy, and oxo;

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lower alkanoyl substituted with benzothiophenyl which may have 1 to 3 higher alkoxy;

lower alkanoyl substituted with benzo[b]furanyl which may have 1 to 3 substituent(s) selected from the group consisting of higher alkoxy and lower alkyl;

lower alkanoyl substituted with benzooxazolyl which may have 1 to 3 substituent(s) selected from the group consisting of higher alkyl, phenyl having lower alkoxy, phenyl substituted with phenyl having lower alkyl, and pyridyl having higher alkoxy;

lower alkanoyl substituted with benzimidazolyl which may have 1 to 3 substituent(s) selected from the group consisting of higher alkyl, and phenyl having lower alkoxy; or

lower alkanoyl substituted with piperidyl or piperazinyl, each of which may have 1 to 3 substituent(s) selected from the group consisting of phenyl having higher alkoxy, and naphthoyl having higher alkoxy.

8. A compound of claim 3, wherein

R^1 is phenyl(lower)alkenoyl substituted with phenyl which may have 1 to 3 substituent(s) selected from the group consisting of lower alkoxy, lower alkyl, higher alkyl, lower alkoxy(lower)alkyl, halo(lower)alkoxy, lower alkenyloxy, halo(higher)alkoxy, and lower alkoxy(higher)alkoxy;

naphthyl(lower)alkenoyl which may have 1 to 3 higher alkoxy;

lower alkynoyl which may have 1 to 3 substituent(s) selected from the group consisting of naphthyl having higher alkoxy, and phenyl

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substituted with phenyl having lower alkyl;

phenyl(C₂-C₆)alkanoyl substituted with phenyl
which has 1 to 3 substituent(s) selected from the
group consisting of lower alkoxy, higher alkoxy,
5 lower alkyl, higher alkyl, and phenyl having lower
alkoxy(lower)alkyl,

in which phenyl(C₂-C₆)alkanoyl may have hydroxy,
oxo, protected amino or amino; or

(C₂-C₆)alkanoyl substituted with naphthyl having
10 higher alkoxy.

9. A compound of claim 4, wherein

R¹ is benzoyl substituted with saturated 6-membered
heteromonocyclic group containing at least one
15 nitrogen atom which may have 1 to 3 substituent(s)
selected from the group consisting of phenyl
having lower alkoxy, phenyl having higher alkoxy,
phenyl having lower alkyl, phenyl having lower
alkoxy(higher)alkoxy, phenyl having higher
20 alkenyloxy, piperidyl substituted with phenyl
having lower alkoxy, piperidyl, cyclo(lower)alkyl
having phenyl, phenyl having cyclo(lower)alkyl,
and phenyl substituted with triazolyl having oxo
and lower alkyl,

25 in which benzoyl may have halogen;

benzoyl substituted with unsaturated 5-membered
heteromonocyclic group containing 1 to 2 oxygen
atom(s) and 1 to 3 nitrogen atom(s) which may have
1 to 3 substituent(s) selected from the group
30 consisting of higher alkyl, phenyl having lower
alkoxy, phenyl having higher alkoxy, phenyl having
lower alkoxy(higher)alkoxy, and phenyl substituted
with phenyl having lower alkoxy;

benzoyl substituted with 5 or 6-membered
35 heteromonocyclic group containing 1 or 2 nitrogen

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atom(s) which may have 1 to 3 substituent(s) selected from the group consisting of higher alkyl and phenyl having lower alkoxy;

5 benzoyl substituted with 5-membered heteromonocyclic group containing 1 to 2 nitrogen atom(s) and 1 to 2 sulfur atom(s) which may have 1 to 3 substituent(s) selected from the group consisting of phenyl having lower alkoxy, phenyl having higher alkoxy, cyclo(lower)alkyl having lower alkyl, phenyl substituted with phenyl having lower alkoxy, phenyl having cyclo(lower)alkyl, phenyl having piperidine, and phenyl having lower alkoxy(higher)alkoxy;

15 benzoyl substituted with phenyl having higher alkoxy substituted with unsaturated 3 to 8-membered heteromonocyclic group containing at least one nitrogen atom;

20 benzoyl substituted with phenyl having higher alkoxy substituted with saturated 6-membered heteromonocyclic group containing 1 to 2 oxygen atom(s) and 1 to 3 nitrogen atom(s) which may have lower alkyl;

25 benzoyl substituted with phenyl having lower alkoxy(higher)alkoxy;

 benzoyl substituted with phenyl having lower alkenyl(lower)alkoxy;

 benzoyl substituted with 2 lower alkoxy;

 benzoyl substituted with phenyl having lower alkyl; or

30 benzoyl substituted with phenyl having higher alkyl.

10. A compound of claim 5, wherein

35 R¹ is phenyloxy(lower)alkanoyl which may have 1 to 3 higher alkoxy;

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phenyl(lower)alkoxy(lower)alkanoyl which may have 1 to 3 higher alkoxy; or

phenylamino(lower)alkanoyl which may have 1 to 3 higher alkoxy.

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11. A compound of claim 1, wherein

R¹ is benzoyl substituted with piperazinyl which may have 1 to 3 substituent(s) selected from the group consisting of phenyl having lower alkoxy, phenyl having higher alkoxy, phenyl having lower alkyl, phenyl having lower alkoxy(higher)alkoxy, phenyl having higher alkenyloxy, piperidyl substituted with phenyl having lower alkoxy, cyclo(lower)alkyl having phenyl, phenyl having cyclo(lower)alkyl, and phenyl substituted with triazolyl having oxo and lower alkyl,

10

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in which benzoyl may have halogen;

benzoyl substituted with isoxazolyl which may have 1 to 3 substituent(s) selected from the group consisting of higher alkyl, phenyl having lower alkoxy, phenyl having higher alkoxy, phenyl having lower alkoxy(higher)alkoxy, and phenyl substituted with phenyl having lower alkoxy;

20

benzoyl substituted with phenyl having lower alkoxy(higher)alkoxy;

25

benzoyl substituted with phenyl having lower alkyl;

benzoyl substituted with phenyl having higher alkyl;

30

phenyl(lower)alkenoyl substituted with phenyl which may have 1 to 3 substituent(s) selected from the group consisting of lower alkoxy, lower alkyl, higher alkyl, lower alkoxy(lower)alkyl, halo(lower)alkoxy, lower alkenyloxy, halo(higher)alkoxy and lower alkoxy(higher)alkoxy;

35

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benzoyl substituted with thiadiazolyl which may have 1 to 3 substituent(s) selected from the group consisting of phenyl having lower alkoxy, phenyl having higher alkoxy, cyclo(lower)alkyl having lower alkyl, phenyl substituted with phenyl having lower alkoxy, phenyl having cyclo(lower)alkyl, phenyl having piperidyl, and phenyl having lower alkoxy(higher)alkoxy; or

benzoyl substituted with oxadiazolyl which may have 1 to 3 substituent(s) selected from the group consisting of phenyl having lower alkoxy, phenyl having higher alkoxy, phenyl having lower alkoxy(higher)alkoxy, higher alkyl and phenyl substituted with phenyl having lower alkoxy.

12. A compound of claim 11, wherein

R^1 is benzoyl substituted with phenyl having lower alkoxy(higher)alkoxy; or

benzoyl substituted with phenyl having lower alkyl.

13. A compound of claim 11, wherein

R^1 is benzoyl substituted with piperazinyl which may have phenyl having lower alkoxy;

benzoyl substituted with isoxazolyl which may have phenyl having lower alkoxy;

benzoyl substituted with thiadiazolyl which may have phenyl having lower alkoxy(higher)alkoxy; or

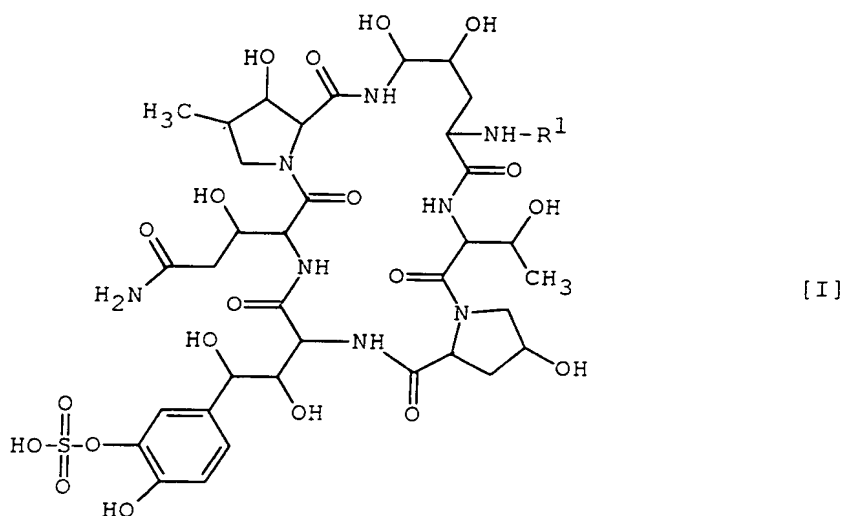
benzoyl substituted with oxadiazolyl which may have phenyl having lower alkoxy.

14. A compound of claim 11, wherein

R^1 is phenyl(lower)alkenoyl substituted with phenyl which may have lower alkoxy.

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15. A process for the preparation of a polypeptide compound of the formula [I] :



wherein

R^1 is lower alkanoyl substituted with unsaturated
6-membered heteromonocyclic group containing at
least one nitrogen atom which may have one or more
suitable substituent(s);

lower alkanoyl substituted with 1,2,3,4-
tetrahydro-isoquinoline having higher alkoxy;

lower alkanoyl substituted with unsaturated
condensed heterocyclic group containing at least
one oxygen atom which may have one or more
suitable substituent(s);

lower alkanoyl substituted with unsaturated
condensed heterocyclic group containing 1 to 3
sulfur atom(s) which may have one or more suitable
substituent(s);

lower alkanoyl substituted with unsaturated
condensed heterocyclic group containing 2 or more
nitrogen atom(s) which may have one or more
suitable substituent(s);

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lower alkanoyl substituted with saturated 3 to 8-membered heteromonocyclic group containing at least one nitrogen atom which may have one or more suitable substituent(s);

5 ar(lower)alkenoyl substituted with aryl which may have one or more suitable substituent(s);

naphthyl(lower)alkenoyl which may have one or more higher alkoxy;

10 lower alkynoyl which may have one or more suitable substituent(s);

(C₂-C₆)alkanoyl substituted with naphthyl having higher alkoxy;

15 ar(C₂-C₆)alkanoyl substituted with aryl having one or more suitable substituent(s), in which ar(C₂-C₆)alkanoyl may have one or more suitable substituent(s);

20 aroyl substituted with heterocyclic group which may have one or more suitable substituent(s), in which aroyl may have one or more suitable substituent(s);

aroyl substituted with aryl having heterocyclic(higher)alkoxy, in which heterocyclic group may have one or more suitable substituent(s);

25 aroyl substituted with aryl having lower alkoxy(higher)alkoxy;

aroyl substituted with aryl having lower alkenyl(lower)alkoxy;

aroyl substituted with 2 lower alkoxy;

30 aroyl substituted with aryl having lower alkyl;

aroyl substituted with aryl having higher alkyl;

aryloxy(lower)alkanoyl which may have one or more suitable substituent(s);

35 ar(lower)alkoxy(lower)alkanoyl which may have one or more suitable substituent(s);

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arylamino(lower)alkanoyl which may have one or more suitable substituent(s);

lower alkanoyl substituted with pyrazolyl which has lower alkyl and aryl having higher alkoxy;

5 lower alkoxy(higher)alkanoyl, in which higher alkanoyl may have one or more suitable substituent(s);

10 aroyl substituted with aryl having heterocyclicoxy, in which heterocyclicoxy may have one or more suitable substituent(s);

aroyl substituted with cyclo(lower)alkyl having lower alkyl;

indolylcarbonyl having higher alkyl;

naphthoyl having lower alkyl;

15 naphthoyl having higher alkyl;

naphthoyl having lower alkoxy(higher)alkoxy;

aroyl substituted with aryl having lower alkoxy(lower)alkoxy(higher)alkoxy;

20 aroyl substituted with aryl having lower alkoxy(lower)alkoxy;

aroyl substituted with aryl which has aryl having lower alkoxy;

aroyl substituted with aryl which has aryl having lower alkoxy(lower)alkoxy;

25 aroyl substituted with aryl having heterocyclicoxy(higher)alkoxy;

aroyl substituted with aryl having aryloxy(lower)alkoxy;

30 aroyl substituted with aryl having heterocycliccarbonyl(higher)alkoxy;

lower alkanoyl substituted with oxazolyl which has aryl having higher alkoxy;

lower alkanoyl substituted with furyl which has aryl substituted with aryl having lower alkoxy;

35 lower alkanoyl substituted with triazolyl which

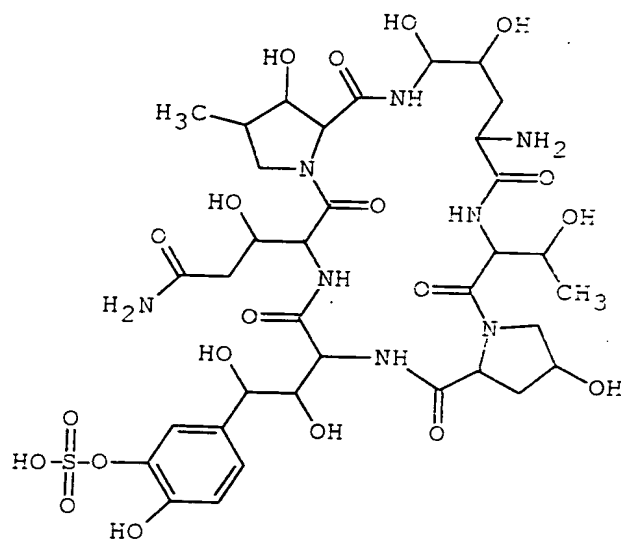
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has oxo and aryl having higher alkyl;
 higher alkanoyl having hydroxy;
 higher alkanoyl having ar(lower)alkyl and
 hydroxy;

5 3-methyl-tridecenoyl; or

(C₂-C₆)alkanoyl substituted with aryl having
 higher alkoxy, in which (C₂-C₆)alkanoyl may have
 amino or protected amino, and
 a pharmaceutically acceptable salt thereof,
 10 which comprises

1) reacting a compound of the formula :



[III]

or its reactive derivative at the amino group or a salt
 thereof, with a compound of the formula :

30 R¹ - OH

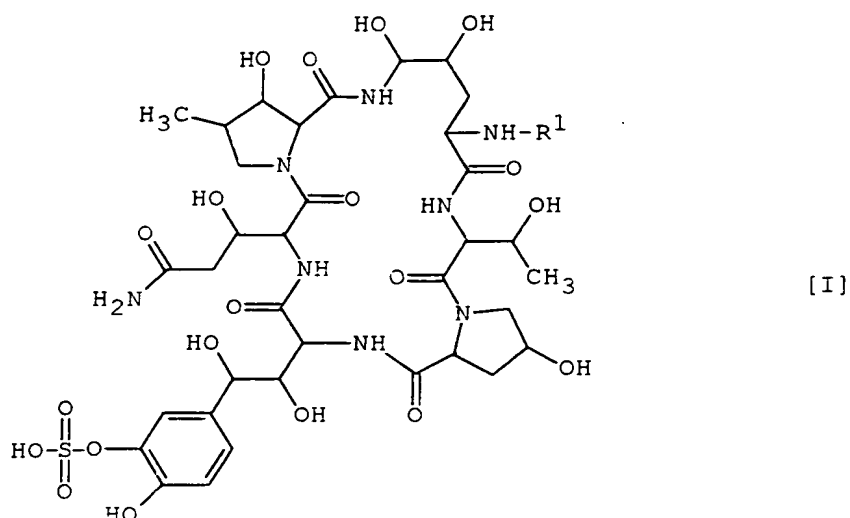
[III]

wherein R¹ is defined above,

or its reactive derivative at the carboxy group or a
 salt thereof, to give a compound [I] of the formula :

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wherein R¹ is defined above,
or a salt thereof.

5

16. A pharmaceutical composition which comprises, as an active ingredient, a compound of claim 1 or a pharmaceutically acceptable salt thereof in admixture with pharmaceutically acceptable carriers or excipients.

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17. Use of a compound of claim 1 or a pharmaceutically acceptable salt thereof as a medicament.

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18. A compound of claim 1 or a pharmaceutically acceptable salt thereof for use as a medicament.

19. A method for the prophylactic and/or the therapeutic treatment of infectious diseases caused by pathogenic microorganisms which comprises administering a compound of claim 1 or a pharmaceutically acceptable salt thereof to a human being or an animal.

20

INTERNATIONAL SEARCH REPORT

Int ional Application No

PCT/JP 95/01983

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C07K7/56 A61K 31/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C07K A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,Y	EP,A,0 462 531 (FUJISAWA PHARMACEUTICAL CO) 27 December 1991 see the whole document ---	1-19
Y	EP,A,0 561 639 (LILLY CO ELI) 22 September 1993 see the whole document -----	1-19

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

8 December 1995

Date of mailing of the international search report

11.01.96

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Authorized officer

Groenendijk, M

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP 95/01983

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 17, 19
because they relate to subject matter not required to be searched by this Authority, namely:
Remark: Although claims 17 and 19 are directed to a method of treatment of the human/animal body the search has been carried out and based on the alleged effects of the compound/composition.

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP 95/01983

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0462531	27-12-91	AU-B- 651347	21-07-94
		AU-B- 7843591	16-01-92
		CN-A- 1059729	25-03-92
		JP-A- 4352799	07-12-92
		OA-A- 9369	15-09-92
		US-A- 5376634	27-12-94
		EP-A- 0486011	20-05-92
EP-A-0561639	22-09-93	JP-A- 5000966	08-01-93
		AU-B- 3534193	23-09-93
		CZ-A- 9300416	13-07-94
		JP-A- 6056892	01-03-94